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Translation

SOVIET SCIENCE AND TECHNOLOGY POLICY

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SOVIET SCIENCE AND TECHNOLOGY POLICY

This non-serial report contains selected translations of Russian articles on the planning and administration of Soviet research and development and the introduction of scientific achievements into industry.

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EXPERTS DETAIL COURSE OF TECHNICAL PROGRESS

Problems of Improving Management of Scientific-Technical Progress

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 2, Feb 81 pp 18-25

[Article by D. Zhimerin, first deputy chairman of the USSR State Committee for Science and Technology]

[Text] The Soviet Union possesses a huge scientific-technical potential. Thousands of scientific institutions and tens of thousands of project planning and design organizations have been created in the country. More than 1.3 million scientists are working in the field of science and technology. In the present stage of economic development application of scientific-technical discoveries and developments is the principal means of intensifying production, of raising the productivity of social labor and of augmenting the national income.

The Communist Party and the Soviet Government have always paid particular attention to science and technology and to utilization of their advances in the economy. The CPSU Central Committee's draft of the "Main Lines of USSR Economic and Social Development in the Period 1981-1985 and in the Period up to the Year 1990" points out that in the 11th Five-Year Plan the development of science and technology is to be subordinated to a still greater degree to solving the most important problems of the further progress of Soviet society and of speeding up the economy's transition to the strategy of intensive development.

Science's impact on production is growing uninterruptedly. For instance, whereas in the Ninth Five-Year Plan the saving from the use of scientific developments was 12.3 billion rubles, in the 10th it increased 1.5-fold. In the 10th Five-Year Plan approximately 18,500 prototypes of new models of machines, equipment, apparatus and instruments were created; at the outset of 1980 75,300 product designations bore the government Quality Emblem.

Soviet scientists, design engineers, process engineers and workers have created many one-of-a-kind prototypes of machines and installations that equal or surpass the world level. For example, the blast furnace of the Krivoy Rog Metallurgical Plant, which has a volume of 5,000 cubic meters and an output of 4 million tons of pig iron per year, is the largest in the world. In its technical and economic indicators it considerably surpasses other large blast furnaces. The smelting process is controlled in this furnace by means of Soviet-made Model M-6000 control computers.

Experience in operating the nuclear reactors of the Leningradskaya, Kurskaya, Novovoronezhskaya, Chernobyl'skaya and other AES's [nuclear power plant] with unit capacities of 1 million kilowatts has made it possible for Soviet scientists and design engineers to develop a one-of-a-kind reactor with a capacity of 1.5 million kilowatts. It will be installed at the Ignalinskaya AES, which is under construction.

Our scientists were the first in the world to develop and create a new type of nuclear reactor operating on fast neutrons. Its singular feature is that in it uranium-238, whose weight is 99.3 percent of uranium ore, is drawn into the fission process. Effective utilization of uranium ore is thereby increased tens of times over (v desyatki raz).

Walking and bucket-wheel excavators created in the USSR are equal in their technical-and-economic parameters to the best specimens in the world. The output of the bucket-wheel excavators (2,000-5,250 cubic meters/hour) is 1.5-2-fold more than the cyclical technique. Walking excavators with a bucket capacity of 40-80 cubic meters and a boom length of 85 meters make it possible to undertake stripping operations without trucks and afford a 3-4-fold increase in labor productivity.

Substantial success has been attained in improving existing production process technologies and in creating new ones. For example, petroleum recovery from underground has been increased to 43 percent by exerting man-made influences on petroleum reservoirs. This is the highest level in the world.

The Soviet Union is the birthplace of synthetic rubber. By improving the process of its production, Soviet scientists have managed to obtain a stereoregular rubber which with respect to many indicators is equal to natural rubber, and motor vehicle tires with synthetic-fiber cord have a longer life than those without it.

There have been important achievements in production of synthetic diamonds and in growing crystals of silicon, ruby and sapphire. Precious diamonds are now being widely used in tools for machining metals and for drilling wells.

The production of man-made crystal from pure silicon was a true breakthrough in converter equipment. Semiconductor converters of electric current have replaced expensive and unreliable mercury-vapor rectifiers and have displaced expensive and cumbersome motor generators in rolling mills and other machinery in which it must be possible to regulate and adjust the rpm.

Silicon semiconductor elements have also accomplished a technical revolution in development of computer equipment. They have been used as the basis of electronic computers capable of performing between hundreds of thousands to hundreds of millions of computational operations (of the "addition--subtraction" type) per second.

Silicon crystals 3 x 3 mm in size have been used to make pocket calculators, microprocessors and microcomputers. Microelectronics is radically altering the processes for controlling any machine--machine tools with digital program control, self-contained units, motor vehicles, washing machines and household electric ranges.

Automation of production and control of machines not only ensure a substantial rise of labor productivity, but also alter its social character.

Technical progress is ultimately manifested in the systematic renewal of the means of production and of the products they produce. Over the last 20 or 25 years the process of product renewal has grown 3.5-4-fold and even more for certain progressive industries.

Acceleration of technical progress is ensured by the growing proportion of investments in science. For instance, they have risen from 8.2 percent in the 1961-1965 period to 13.3 percent in the 1971-1975 period.

Development of science and technology and acceleration of technical progress are taking place on the basis of state planning concerning the most important problems of the national economy in accordance with plans of new technology drafted and approved by ministries and departments.

In accordance with party and government directives comprehensive programs for the most important problems of the national economy have been the basis of state planning of the development of science and technology in the 10th Five-Year Plan. The USSR State Committee for Science and Technology has drafted and approved 206 such programs, including 20 for the machinebuilding industry, 18 for the chemical and petrochemical industries, 22 for metallurgy, 25 for problems of fuel and energy, 12 for agriculture, 7 for transportation and 8 for computer technology. The list of these programs has been approved by the USSR Council of Ministers.

The comprehensive programs have been compiled for a 5-year period, and specific assignments are given for the years of the 5-year period. They are aimed at solving the most important scientific-technical problems of the sectors of the economy and encompass the complete cycle--from the conduct of scientific research to creation of the full-scale prototype. A head organization (ministry, scientific research institute, design office, enterprise) is designated for each of them and bears responsibility for performance of the program as a whole, and within it organizations bearing responsibility for fulfillment of individual assignments are designated.

The programs indicate the sources of financing to cover the costs of working on the assignments and the organizations responsible for allocating resources. Submittal of a calculation of the economic efficiency of the proposed scientific-technical development is an unvarying condition of their approval. Altogether the comprehensive programs have incorporated more than 4,500 assignments, including 1,900 for development of new machines and combinations, about 1,000 for creation of progressive manufacturing processes, and approximately 900 for development of new materials, including synthetic materials or materials with properties given in advance.

Thus the comprehensive programs have envisaged a purposive planned development of science and technology.

It is thought by some that the programs are not resolving intersector problems. But the content of the comprehensive programs is not contrary to the concept of intersector problems. In the present stage the assimilation of the advances of science and technology and assurance of the progress of production are unthinkable

solely through the efforts and resources of a single sector. Is it possible, say, to compile a sectorwide program for machinebuilding without linking it to the sectors and industries that are the consumers of its products and which are manufacturing the principal materials (metal, plastics, lubricants, fuel, and so on) and components (electrical equipment industry, computer equipment, and so on)? The products of powder metallurgy envisaged in the sector's comprehensive program are being used in many machinebuilding industries, and it is there that they yield the economic benefit.

The comprehensive use of nepheline, from which one can obtain alumina (nonferrous metallurgy), soda (chemical industry) and cement (building materials industry), is an example that refutes the assertion that the programs do not make provision for work on intersector problems.

In accordance with the assignments of comprehensive programs Soviet scientists have developed and verified in experimental installations a production process for energy conversion of Estonian shale and Kansk-Achinsk coal. Its introduction makes it possible to obtain liquid products, gas and chemicals and to improve the coal.

But not uncommonly the performance of intersector measures was held back in the 10th Five-Year Plan because sector planning was imperfect. Assignments for industrial application of new equipment and processes often ended with the manufacture of an experimental prototype, but their series production was put off for subsequent stages by planning agencies. This violation of continuity has had an adverse effect on industry's use of completed scientific-technical developments.

The planning of the development of science and technology has not effectively ensured communication among the many participants carrying out individual assignments of the comprehensive programs. Failure to meet deadlines in performance of one stage has resulted in nonfulfillment of subsequent stages and of the final and concluding stage. That necessitated changes in deadlines for development and detracted from discipline and responsibility for fulfillment of the assignments of the comprehensive programs. Particular difficulties in rapid industrial application of scientific-technical developments occurred because of lack of agreement in determining their state of completion between the scientist and designer on the one hand and the process engineer and production expert on the other. Since scientific and design institutions were not sufficiently motivated to maintain close relations with the process engineering and production services of enterprises, it was often many years before completed projects of these institutions were used.

In 1968 the electrical equipment industry was converted to the new form of planning scientific-technical development projects as an experiment. A unified fund for development of science and technology was built up out of internal profits, and the operation of scientific institutions was converted to the system of job orders which stated not only the deadlines and stages of development projects, but also the enterprise that would put the new product into production.

The new system proved to be effective, utilization of scientific developments speeded up, and the relative share of output in the superior category for the sector as a whole exceeded 42 percent, by comparison with 12.5 percent for machinebuilding as a whole. The interval of time from performance of research to

application of results has decreased 20-40 percent on the average over the last 7 years in the Ministry of Electrical Equipment Industry.

In recent years the ministries of heavy and chemical machinebuilding have been converted to this system, and this has brought about increases of 1.5-fold and four-fold, respectively, in the relative share of new developments. At the present time 15 machinebuilding ministries have been converted to the system of unified financing of R&D projects.

The ministries have drafted master charts for management of sectors and industries which call for creation of production associations and scientific-production associations (NPO's). There are now in operation about 250 NPO's, which are headed by scientific subdivisions. This kind of structure of the association ensures an organic relationship among the scientific, design and production components, i.e., it eliminates differences in interpretation of the term "completed project." Constructive solution of the problem of linkage between research, design and existing technology is an advantage of the NPO.

Over the period of their activity (10 years) the NPO's have proven the effectiveness of this form of relation between science and production. For example, the NPO Kriogenmash has reduced by more than half the time required to build large units. In the NPO Plastpolimer it took 5 years (instead of the usual 10-11) to develop, manufacture and put into operation a unit for manufacturing high-density polyethylene which exceeds foreign examples in its technical and economic level and its performance indicators. Another important problem was solved at the same time--introduction of units with higher unit capacity. The length of the "science--production" cycle in that association has been 1-5 years for various types of newly created production plants, and in the NPO Soyuzavtomatstrom the time required to set up a computerized system for management of the production activity of plants, including computerization of the management of the enterprises as a whole was cut in half. The same can be said of the developments of the NPO Pishchepromavtomatika and other associations.

At the same time certain ministries have set up NPO's without a production capability, have unified scientific research institutes, design offices and enterprises which are diverse in their configuration; in many NPO's the experimental shops are overloaded with production of series-produced products, and so on.

As experience has shown, one can identify the following basic adverse factors in the accomplishment of technical progress:

i. the gap between completion of R&D projects and use of the results in production;

ii. inadequate communication of research and design organizations with the production operation in which the results of their developments are to be applied;

iii. a slackening of responsibility of scientific research institutes and design offices for deadlines and especially for the quality of the development when direct relations with production do not exist;

iv. the defectiveness of paying for projects of scientific research institutes and design offices when there is little monitoring of adherence to deadlines and the level of quality of development;

v. feeble material incentives of research and design staffs linked to the results of their work.

Practical strategies for correcting these tendencies have been reflected in the decree of the CPSU Central Committee and USSR Council of Ministers on improvement of the economic mechanism. It provides for a number of measures which are expected to strengthen the relationship between science and production and to ensure faster introduction of scientific advances into economic practice. This has in turn been developed in the draft of the Main Lines ..., which points up the need to ensure the drafting and fulfillment of comprehensive target programs for solving the most important scientific-technical problems and to substantially reduce the time required to create new technology and put it into production.

The USSR State Committee for Science and Technology, USSR Gosplan and USSR Gosstroy have drafted and approved for the entire 11th Five-Year Plan 160 comprehensive programs for the most important problems of the national economy (including programs for basic research by the USSR Academy of Sciences). Within this group 38 particularly important comprehensive target programs have been identified. Application of the results of their development could yield a maximum economic benefit in the national economy.

The programs envisage all measures to ensure solution of the national economic problem as a whole, encompassing all the accompanying tasks. They define the participation not only of the head organization which is responsible for the end result, but also of all scientific research institutes, design offices and industrial enterprises of related sectors and industries on which the program's fulfillment depends.

The principal purpose of the comprehensive programs in the sector of fuel and energy resources is to increase the economic efficiency of the extraction and production of fuel and energy and conservation of their use in all parts of the national economy. In the electric power industry this means building more powerful and economically advantageous new units to be used in thermal and especially nuclear power plants. The course adopted in development of nuclear reactors is toward increasing their unit capacity to 1.5 million kilowatts and eventually even to 2 million kilowatts. Plans have been made to speed up efforts to create nuclear reactors using fast neutrons, which make it possible to increase utilization of uranium ore tens of times over (v desyatki raz).

Provision has been made for completion of R&D projects to create and build a one-of-a-kind DC transmission line from Ekibastuz to the Center at a voltage of 1.5 million volts and a power capability of 6 million kilowatts.

An extensive program is to be carried out to bring into the energy budget perpetually renewable sources of energy--sun, wind, the heat of the earth and waterpower.

Development of the petroleum and gas industry is continuing in the 11th Five-Year Plan, and in 1985 the level of petroleum production (including gas condensate) is

to be brought up to 620-645 million tons and that of gas up to 600-640 billion cubic meters. This high level of production can be achieved provided intensive methods are applied. To that end the comprehensive program envisages application of new methods of influencing strata that make it possible to considerably increase petroleum recovery of reservoirs being worked. Measures will be taken to automate control of patterns of operation of petroleum and gas wells by means of electronic equipment. These steps are aimed at ensuring larger extraction of petroleum and gas, reduction of the number of operational personnel, higher labor productivity and improvement of working conditions.

In the area of gas and petroleum pipeline transport the comprehensive program calls for carrying out research and development aimed at increasing pressure to 100-120 atmospheres. This will increase the carrying capacity of pipelines with a diameter of 1,420 mm to 33 percent and reduce the labor required to build them.

In the coal industry during the 11th Five-Year Plan open-cut mining, which is the most efficient, is to develop at a faster pace on the basis of introduction of progressive technology and mining and transport equipment with high unit capacity. These problems can be solved effectively by further mechanization of labor, especially of underground operations. The comprehensive program calls for the relevant scientific research institutes and design offices to create coal mining machines that ensure maximum mechanization of labor.

The work of building an experimental underground mine in which full mechanization would increase labor productivity 10-15-fold over the present level is to be completed during the 11th Five-Year Plan. The working conditions of miners will moreover be improved substantially.

Scientific research institutes and design offices of the coal industry have been set the task in the comprehensive program of speeding up development and realization of a system for automatic control of underground coal mining machines by means of electronic equipment. The automatic system provides control of the machinery without the constant presence of personnel, alters the social character of work and substantially increases labor productivity.

In the 13 comprehensive programs for machinebuilding assignments are envisaged for development and manufacture of the most up-to-date equipment, machines and instruments. Machinebuilders confront the principal task of raising the technical-and-economic level and reliability of machines and equipment and increasing their unit capacity and specific output.

Soviet machinebuilding stands at a high level, and as a result the socialist economy is developing effectively, work is being mechanized, new materials are being created, and overall scientific-technical problems are being solved. At the same time in many cases there is no set of machines that would ensure full mechanization of an entire technological process. There is a particular lag in mechanizing materials-handling operations, in which several million people are employed at heavy and manual labor. Solving this problem has been taken into account in the comprehensive program for mechanizing materials-handling operations.

A comprehensive program has also been drafted for speeding up the production of automatic manipulators (robots). Their use will make it possible to sharply increase full mechanization both of production processes now in use and also new ones to be created.

R&D projects to automate control of machines, sets of machines and manufacturing processes are expanding with every year and every 5-year period. The draft of the Main Lines of USSR Economic and Social Development in the Period 1981-1985 and in the Period up to the Year 1990 calls for the advances of science and technology to be used as the basis for developing the production and ensuring widespread introduction of automatic manipulators (industrial robots) incorporating automatic control systems using microprocessors and minicomputers and for setting up automated shops and plants.

Considerable experience has been acquired in the country in automating complex production processes with minicontrol computers. In the 11th Five-Year Plan broader automation is intended using microprocessors and microcomputers. Achievements in the production of Soviet microelectronics are making it possible to automate not only complicated processes or sets of machines, but indeed practically any unit. On the basis of preliminary computations, approximately 140,000 units, machines, pilot installations and measuring complexes could be automated on the basis of microelectronics in the 11th Five-Year Plan.

The development and creation of microelectronics, software for it and control systems based on it--all this has been envisaged in the comprehensive program for the 1981-1985 period devoted to this problem.

In the draft of the Main Lines ... a special section sets forth measures to develop the agroindustrial complex. In this exceedingly important sector of the economy 18 comprehensive programs, including 6 target programs, have been drafted and approved to solve its scientific-technical problems.

The comprehensive target program for grain sets the task of increasing the gross grain harvest by at least 25 percent by using high-yield varieties, proper soil and crop practices, fertilizer and improved harvesting machines. In beet raising provision has been made to use high-yield sugar beet varieties and hybrids and to increase the sugar content to 17.5-18.5 percent and the yield to 350-450 quintals per hectare.

Scientific organizations which have been commissioned to develop plant growth regulators that ensure a rise in the yield and quality of farm crops have been designated in an independent program.

In other comprehensive programs the task has been set of creating and manufacturing highly efficient harvesting equipment, of full mechanization of livestock raising, and of better utilization of irrigated and reclaimed land. All these and other measures are aimed at intensification of agricultural production and at fulfillment of the assignments of the 11th Five-Year Plan.

In view of the difficulties in fulfilling the assignments of the comprehensive programs during the 10th Five-Year Plan (above all because of the problematical nature

of interrelations among the many organizations belonging to different ministries and departments), coordinating commissions headed by distinguished scientists and specialists have been designated in the new 5-year period. The organization of these commissions is aimed at improving the coordination of efforts outlined in the comprehensive target programs and at enhancing responsibility for fulfillment of assignments and for accomplishment of the goals which have been set.

Particular attention is being paid to compiling the comprehensive programs to calculations of the economic efficiency of utilizing the results of R&D projects. According to figures submitted, fulfillment of most of the assignments of the comprehensive programs in the 11th Five-Year Plan (approximately 60 percent, the rest will be completed in the next 5-year period) will yield profit amounting to more than 23 billion rubles on the 1985 volume of output.

The comprehensive programs for the 11th Five-Year Plan have introduced a substantial change in that they assign deadlines for organizing series production of new products on the basis of completed research and design developments. This eliminates the gap between completion of R&D work and organizing production of the new technology.

We have noted above that all projects of sectorwide scientific research institutes and design bureaus are being converted to the system of job orders which define the assignment for development, completion dates, amounts of financing, and also designate the enterprise at which the results of development projects are to be realized. The task is not to allow departures from this system, especially as concerns designation of the enterprise which is to manufacture the new product. It therefore seems advisable to utilize the experience of VNIImetmash [All-Union Scientific Research and Project Planning and Design Institute of Metallurgical Machinebuilding], which has been conducting R&D projects in close contact with the association Uralmashzavod and other enterprises, and that of the Electric Welding Institute imeni Ye. O. Paton, whose success in carrying out development projects has also been ensured to a considerable degree by its close relationship with production people.

In the new 5-year period substantial changes are taking place in the system of planning, financing and economic incentives of efforts to create new technology, organize its production and apply it in the sectors of the economy. Financing will now come from a single fund built up from deductions from planned profit in a proportion stated in percentages of net output or commodity output.

The decree of the CPSU Central Committee and USSR Council of Ministers on improving the economic mechanism calls for a development fund, a fund for social welfare and cultural programs and a bonus fund for developers of new technology to be formed in scientific research institutes and design offices.

When efficient new technology and particularly important machines are manufactured, enterprises and the relevant R&D organizations will obtain resources (by virtue of supplemental price additions), which will serve as an incentive for speeding up technical progress.

The system of paying for R&D projects performed by sectorwide scientific research institutes and design offices is also being radically changed. This payment will

not be made for fulfillment of projects by stages and quarters of the year, but will be made for the development that has been entirely completed and accepted by the client. All costs are reimbursed with bank credit, which must be repaid upon completion of the project. If the planned deadline for delivery of the work is exceeded, credit is still extended, but a higher rate of interest is charged. Scientific research institutes and design offices will pay these penalties out of their own resources in the unified fund.

Assuming that these measures are precisely adhered to and performed within a short period of time, they should yield a sizable economic benefit and should guarantee faster performance of scientific-technical and design developments and faster organization of the production of new machines, machinery, instruments and other products.

[illegible] Izdatel'stvo "Ekonomika", "Planovoye khozyaystvo", 1981

Science and Accelerated Technical Progress in the Economy

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 2, Feb 81 pp 26-35

[Article by B. Paton, president of the Ukrainian Academy of Sciences and twice awarded the title of Hero of Socialist Labor]

[Text] The Communist Party and Soviet Government are paying constant attention to developing science in our country and to its effective use in the interests of society. The principles worked out by V. I. Lenin for management of science, enriched by the experience of building socialism, have become the norm governing the attitude of the party toward organizing thorough scientific exploration and performance of comprehensive basic research programs.

The importance of science in building communism is increasing more and more; this is manifested in its ever closer integration with production, in the expanding scale of research, and in the beneficial impact research results are having on all spheres of the life of society. Utilizing scientific advances in every way in the interest of technical progress has become the principal condition for higher labor productivity, intensification of production and important transformations in the structure of the economy. Science, as a productive force in its own right, is exerting a vigorous impact on economic development, above all on the growth of the leading heavy industries--the fuel and energy complex, machinebuilding, metallurgy and agricultural production.

The CPSU Central Committee's draft of the "Main Lines of USSR Economic and Social Development in the Period 1981-1985 and in the Period up to the Year 1990" has set the task of enhancing the effectiveness of scientific research, of substantially shortening the time needed to apply the advances of science and technology to production, of improving coordination of the activity of scientific institutions, and of deepening the relationship of basic and applied research with production.

Widespread application of the results of the most recent basic research in productive activity plays a paramount role. Realized in the form of progressive equipment and up-to-date technology, in new control systems, and in the workers' rising cultural, educational and vocational level, they make it possible to see more clearly the shape that future production will take and to identify the pathways of

scientific-technical and social progress. Achieving and using superhigh and superlow temperatures, superhigh pressures, high vacuum, metals with high purity, tremendous increases and reductions of speeds, and large ranges of oscillating frequencies have led to intensive improvement of the implements and means of labor and to the emergence of fundamentally new types of production.

Science's impact on production depends in large part on the planning of research and on the level and quality of that planning. The principal factor in a further rise in the level of planning of scientific research is broader use of the target-program method, which presupposes the posing of straightforwardly stated goals, selection of optimum ways and means of attaining them, and organizing ongoing management of the research process and an effective system of monitoring its progress. Improvement of the practice of research planning, concentration of scientific energies and material resources on the most important directions of science, close linkage between current and multiannual planning, and more widespread use of the target-program method in organizing scientific projects are creating the largest opportunities for increasing the effectiveness of scientific exploration and for speeding up use of the results of research.

The Ukrainian Academy of Sciences is paying significant attention to use of the target-program method of planning. Its scientists are participating in carrying out scientific programs of AN SSSR [USSR Academy of Sciences].

We should note as well the programs drawn up in the Ukrainian Academy of Sciences for genetic engineering, membrane geology, etc. These efforts are leading toward solution of overall problems of contemporary society--raising highly productive varieties of farm crops and livestock breeds and the treatment of inherited and acquired diseases. They afford the possibility of creating methods of managing biosynthesis of nerve and muscle cells and of offering the health service new forms of drugs and biologically active substances.

The academy's institutes are participating in the programs of scientific research projects approved by the USSR State Committee for Science and Technology and the republic's gosplan. They all contain a stage devoted to industrial application, which is why they have become an effective instrument toward practical utilization of the recent achievements of science and technology.

Along with the country's other research organizations and industrial enterprises scientific institutions of the Ukrainian Academy of Sciences are carrying out 94 programs at the union level and 36 at the republic level, and 10 plans of R&D projects. The institutes devoted to electric welding, casting problems, cybernetics, problems in the study of materials, and superhard materials have a leading role in solving scientific-technical problems at the level of the country as a whole and the republic.

These programs and plans call for solution of major national economic and scientific problems mostly on behalf of the leading sectors of the economy. Sixteen of them are aimed at solving the problems of the fuel and energy complex: creating and putting into production large power generating units for thermal and nuclear power plants; shaping the USSR Unified Electric Power System by building 750- and 1,150-kv power transmission lines to form the system; development and introduction

of new methods and equipment in the extraction, refining and transport of petroleum and gas. Scientists are applying no small effort to creating new pieces of equipment: for example, for working coal seams where there is an explosion hazard; for forecasting and preventing sudden discharges of coal, rock and gas; and for increasing the efficiency of utilization of gaseous, liquid and solid fuels.

Assignments which have fundamental importance to development of Soviet machinebuilding occupy an important place in the programs. Our academy is collaborating with the country's other scientific institutions and departments in carrying out 17 such programs at the union level. The institutes of the Ukrainian Academy of Sciences are making a contribution to creating and putting into production new manufacturing processes, machines and apparatus for production of synthetic fibers and other products of the chemical industry, new electrical heating equipment with large unit capacity for heat treatment of the products of machinebuilding. Scientists are developing fundamentally new types of machines for various industries. They have proposed for designers fire-resistant materials and coatings which possess the assigned set of physicomechanical, chemical and other properties and which ensure a reduction of metal intensiveness and increase service life, productivity and reliability of machines and machinery. A scientific council for the problem "Scientific Bases of Higher Reliability and Service Life of Machines and Installations" has been created within the Ukrainian Academy of Sciences to coordinate research in this direction.

As we are aware, metallurgy occupies leading positions in the country's industry. Ten programs in whose fulfillment our scientists are participating are aimed at solving a number of scientific-technical problems on behalf of this industry, which is basic to the national economy. Among them are the development and introduction of new technologies and improvement of existing ones: submerged-arc welding, production of steel and alloys, continuous pouring of steel and improvement of the quality of rolled products; use of plasma-arc and electron-beam methods of melting metals and alloys, technologies for production of electric-welded pipe with increased strength and anticorrosion coating for gas and petroleum pipelines, and also pipe for lines carrying cooled and liquefied gas.

In the 11th Five-Year Plan the academy will participate in carrying out a comprehensive target program approved by the State Committee for Science and Technology to create and put into production processes and equipment for the gas industry, including multiply pipe for extra-large main gas pipelines operating at 100 atmospheres. Very recent highly efficient processes of welding, facing, and heat cutting are to be developed, and high-output equipment, welding supplies, and monitoring and control equipment are to be prepared for this purpose. In 1981 multiply pipes with a diameter of 1,420 mm are to be put into production at the Vyksa Metallurgical Plant; they are designed for a pressure of 100 atmospheres.

Powder metallurgy is being given an important place in connection with performance of the scientific-technical programs. Use of 1,000 tons of parts manufactured from powders makes available in machinebuilding between 2,000 and 2,500 tons of rolled products or castings, about 80 metal-cutting machine tools and 190 workers.

The academy's scientists are participating in creating technologies and equipment for production of metal powders, fibers, powder-alloys and compounds with high

melting points needed by machinebuilding, electrical engineering and special types of equipment. Further directions of scientific research projects and of increasing the production of powders and products of powder metallurgy were discussed at an all-union conference of scientists and production experts in Kiev in September 1980. Emphasis was put on the need to create new technologies for manufacturing iron and alloy powders and refractory products made from them, of supplying up-to-date equipment to the relevant enterprises, and of expanding the production capability for powder metallurgy so as to satisfy to the fullest the needs of the leading industries.

Accelerated development of agricultural production as an indispensable condition for strengthening the country's economic potential and for increasing the prosperity of the Soviet people has paramount importance in carrying out the party's farm policy. Further intensification of agriculture and raising its efficiency are also inseparably bound up with carrying out scientific-technical programs and with widespread application of the results of scientific research.

Institutions of the Ukrainian Academy of Sciences are taking part in fulfillment of six union-level programs related to developing and applying measures for full chemicalization of agriculture and for raising the yields of farm crops in the country's various soil-climate zones. They are raising new varieties and hybrids of farm crops that meet the requirements of intensive agriculture, and they are also developing methods of protecting plants against pests, diseases and weeds which are harmless to man, animals and the environment.

Our scientists have achieved constructive results in raising and using new high-yield varieties of plants and in combating losses of agricultural raw materials. To be specific, a new variety of high-output semidwarf winter wheat of the intensive type, "Kiyanka," whose seeds have been given to farms in 14 oblasts of Ukrainian SSR, has gone through tests successfully. A radiation technology has been created for pregrafting treatment of grapes that is making it possible to convert all the republic's vineyards to phylloxera-resistant varieties. A technology has been proposed for using fruit waste and low-grade fruit to obtain powders needed by the food industry.

Quite a bit of attention is being paid to the use of new materials and high-output equipment for optimum utilization of water and land resources.

Use of the advances of science and technology in the national economy should be accompanied by a conservationist attitude toward the natural environment. This problem is especially urgent in places where industrial and agricultural production yield a large amount of waste. One of the main tasks in solving this problem is to create low-waste technologies that take into account the requirements of environmental protection.

In the 10th Five-Year Plan research on this problem in the Ukrainian Academy of Sciences was conducted within the framework of 10 programs. In the course of their fulfillment about 100 scientific developments were turned over for practical application, and half of them have already been introduced. This has made it possible to perfect a number of technologies in industrial production and to reduce the harmful gases enterprises are emitting into the atmosphere. A gas-resistant commu-

community of plant species and soil and crop practices have been recommended for cultivating green plantations around industrial enterprises. The method of evaluating the environmental and economic impact of plans for construction of new industrial projects is already in practical use. As a result ecological conditions were improved considerably at the Zaporozhstal' plant, the medicinal preparations plant in Kiev, the Kiev Radyans'ka Ukraina Printing and Publishing Combine, the Kiyevskaya TETs-5 and other enterprises.

During the 11th Five-Year Plan principal attention of the republic's scientists will be concentrated on completing development projects by 1985 whose application during the 12th Five-Year Plan will make it possible to reduce emissions and discharge of harmful substances and production waste by 20-25 percent in Ukrainian SSR as a whole, while at the same time there will be a corresponding growth of production capacity. Important attention will be paid to research into the problems of protecting the waters of the Dnieper drainage basin, to preparation of scientific recommendations and to the environmental and economic feasibility of the structures of the Danube--Dnieper water management complex, to the location of major fuel and power facilities in the republic over the next 20-30 years, to upgrading the environment of the Donbass and the cities of Kiev, Khar'kov and Dneprodzerzhinsk, and to improvement of the ecological situation in the Carpathians.

In future it is very important to concentrate the efforts of scientists and production personnel on eliminating the root causes giving rise to pollution of the environment. At present attention is unfortunately concentrated mainly on analyzing and correcting adverse consequences of industrial activity and their impact on the biosphere.

In the 1981-1985 period scientific institutions of the Ukrainian SSR will be paying much attention to carrying out the republic's major comprehensive scientific-technical target programs. One of the most important among them is the program "Energy Complex," which is designed to solve these problems: improvement of mining operations in the coal industry; more effective use of prospected reserves of petroleum and gas, and specifically a 10-15-percent increase of recovery from the petroleum-bearing stratum; increasing the reliability of operation of power engineering equipment of thermal power stations, industrial enterprises and power transmission systems. Projects are being organized to manufacture and introduce installations to utilize solar energy, wind energy, geothermal energy and other sources.

The comprehensive program "Metal" will ultimately bring about a 1.3-fold increase in the output of high-quality metal products--heat-strengthened rolled products, rails and pipe, including products with anticorrosive coating. Technologies for electroslag melting and vacuum processing of steel will become widespread; projects will be carried out leading toward direct production of iron in kilns and production of metallic powders directly from superconcentrated iron ores.

Under the program "Agroindustrial Complex" scientists will create new industrial technologies for raising highly productive varieties of agricultural crops in order to obtain average grain yields for the republic at a level of 35-40 quintals per hectare and to substantially increase the production of feeds and products of livestock raising. They are developing reliable methods of reducing losses of agricultural products.

The program "Sugar" commits scientists to perfect soil and crop practices in raising sugar beets so as to obtain from every hectare planted a republic average of at least 38-40 quintals of sugar, to improve the methods of mechanized sugar beet harvesting, to bring about a reduction in beet processing time and maximum extraction of sugar and other useful ingredients.

The assignments under the comprehensive program "Labor" are aimed at achieving a 90-percent growth of labor productivity by raising the technical level and improving the organization of production without addition to the work force. Scientists and production personnel are developing and implementing a set of measures to improve the regional and sectoral redistribution of labor resources.

In carrying out the program "Materials Intensiveness" the republic's scientists will be participating in developing and applying efficient methods, including computer methods, of designing and calculating the elements of machines, fabrications and structures that ensure reduction of materials intensiveness in industry and construction.

Institutions of the Ukrainian Academy of Sciences will take a direct part in drafting and carrying out major programs at the union level which N. K. Baybakov, chairman of USSR Gosplan, spoke about in December 1979 in a session of the General Assembly of AN SSSR. These are the fuel and power program and programs for development of transportation, metal conservation, reduction of use of manual labor, development of the BAM [Baykal-Amur Main Rail Line] Zone, and augmentation of production and improvement of quality of consumer goods.

Successful performance of these programs, and indeed acceleration of scientific-technical progress as a whole, depends to a decisive degree on the creation and application of fundamentally new technologies that ensure revolutionary transformations in production. This is a paramount task of state importance. Performing it successfully has not only great economic importance, but also great political significance. The number and quality of production technologies now serve as indicators of any country's economic might and an area of competition of the Soviet Union and other countries of the socialist system with the industrially advanced capitalist states.

Technologies constitute a decisive means of raising labor productivity, of economizing on physical resources, and of combating product losses. Electroslag technology, for example, which was built up on the results of a thorough study of the kinetics of phase transformations and physicochemical processes in metal, have become widely known both in our own country and also abroad. It has revealed fundamentally new possibilities for manufacturing high-quality metals and alloys and has had a transforming impact on many production operations. This technology unifies such technological processes as electroslag melting, casting, deposition, and welding. It has become the basis of a new industry--special electrometallurgy. Electroslag melting alone provides the country an economic benefit amounting to hundreds of millions of rubles. Broader use of electroslag and other technologies the scientists have created will substantially improve the technical capability of industries and bring the country billions of profit.

The following technologies have great practical importance: production of metals which have high ductility and high melting points--molybdenum, chromium and beryllium--and a series of heat-resistant alloys and superhard materials possessing high technical parameters; methods of conserving or completely replacing scarce tool-making materials containing tungsten; the manufacture of rolled multiply high-pressure vessels; production of powders of ferrous and nonferrous metals by atomization of molten metal; the method of cutting off pipelines where accidents have occurred by the blasting method without removing the petroleum from the pipe, etc. These and other developments are now being energetically applied at their enterprises by the country's ministries and departments.

The use of powder welding wire in welding fabrications has become widespread in organizations of the Ministry of Installation and Special Construction Work. In the Soyuzsel'khoztekhnika system a technology recommended by the scientists for depositing a wear-resistant coating of metal on parts of farm machines has given a good account of itself.

Another new technology that is very promising for the national economy is the one for producing aerosols--high-dispersion preparations of silicon used in production of many types of industrial products: new adhesive compositions for the printing industry, highly effective powder materials for extinguishing fires, coatings for artificial leathers, polyester finishes, polishing compounds for optoelectronic devices, and polymer fillers. A study of the patterns of the dispersed state of the substance and of formation of diverse dispersion systems served as a prerequisite for developing this and certain other technologies.

The process development projects of the scientists are making it possible not only to transform production processes, but also to perform certain functions of man's intellectual activity. One such technology is the production of computer software; this technology, which is based on the theory of digital automatic machines and algorithms has resulted in the substitution of an industrial process of creating classes of programs for work done by individual programmers.

The introduction of low-waste technologies which are less materials-intensive and less energy-intensive is yielding a sizable savings of physical and labor resources. But coordinated efforts of scientists and production personnel are needed to achieve this. Jointly with the production association ZIL, our academy, for example, is solving scientific-technical problems whose ultimate objective is to organize low-waste production in machinebuilding. The Institute of Casting Problems has proposed a shorter period of heating in ferritizing high-strength cast iron. Development projects of the Institute of Problems in the Study of Materials has led to introduction of a technology for diffusion boronizing of the engraving of dies, and jig-borer bits made of the superhard material Geksanit-R have been successfully tested and applied.

In the L'vov scientific production association Kineskop they have modernized the design of a color television picture tube, optimum patterns of heat treatment have been recommended for black-and-white and color picture tubes, and a subsystem for product quality control has been introduced.

Most of the scientific-technical programs approved by the republic's gosplan for the 11th Five-Year Plan in which the institutes of the Ukrainian Academy of Sciences will be participating call for the use of progressive technologies that make it possible to economize on raw and processed materials, to reduce expenditures of energy and labor resources, and to increase the output of high-quality products.

In just the last 5 years the scientists of the Ukrainian Academy of Sciences has built from basic research more than 300 new technologies at various levels and for various purposes which are now being applied effectively at enterprises of the ministries of ferrous metallurgy, the chemical industry, the shipbuilding industry, the aircraft industry, the gas industry, the food industry and other industries. They have made a noticeable contribution to raising the level of mechanization and automation and of the quality and reliability of products produced, to reduction of materials and energy intensiveness, and to improvement of working conditions and the environment. The activity of the Ukrainian Academy of Sciences in developing fundamentally new technologies from basic research was commended in 1979 by the CPSU Central Committee. The sale of more than 40 licenses to industrially advanced countries for the technologies we have created is confirmation of their high quality.

The system of scientific organizations that has taken shape in our country is creating favorable conditions for speeding up scientific-technical progress and for uninterrupted functioning of all units in the chain from the scientific idea through technical development to series production. In this chain the principal role is assigned to science. It is, then, a very urgent task to make science more effective.

Development and intensification of basic research will in future continue to be the principal content of the activity of the Ukrainian Academy of Sciences. But the need for intensification of social production is advancing the real and urgent problem of reinforcing a firmer relationship between science and the practice of communist construction. Today, according to the guidance provided us by the party, the practical application of scientific ideas is just as important a task as developing them. On this basis the institutes of the academy will primarily be developing that scientific research whose results can lead to radical qualitative transformation in the sectors of the economy.

Teams of scientists of the Ukrainian Academy of Sciences are striving for most of the results of basic research to be applied immediately in R&D projects necessary to the national economy both at the present time and also in the future. We regard the existence of pilot production subdivisions within scientific research institutions to be an effective instrument in this endeavor. We are deeply convinced that only with such facilities can we develop basic research on the necessary scale and ensure a high degree of readiness of scientific developments to be turned over to industrial enterprises. These organizations not only create conditions for development of basic research within institutes, but they are also participating actively in the development and application of new forms of equipment, instruments and installations.

In a number of important institutes of our academy complexes consisting of the institute, a design office, a pilot production facility and a pilot plant have taken

shape and are successfully operating. They perform the entire cycle of operations from developing the idea to applying the results obtained, and they guarantee a sizable reduction of the time required for practical application of scientific developments. Within such a complex the length of time required for all stages of work on an applied topic is usually between 1 and 3 years, or 5 and 6 years if theoretical research is taken into account, i.e., considerably shorter than the respective average times for the country as a whole.

Work is now being done toward organizational improvement of the activity of scientific-technical complexes and toward guaranteeing start-to-finish planning over the entire chain from development of ideas to application of results. To be specific, a regulation has been drafted on procedure for formation and use of material incentive funds of such complexes.

Diverse forms of relations between science and production, which have given a good account of themselves in practice, are helping to speed up the application of scientific developments. They include above all R&D projects of the academy under 16 comprehensive plans being carried out jointly with union and union-republic ministries of nonferrous metallurgy, chemical and petroleum machinebuilding, the chemical industry, the aircraft industry, the petroleum refining and petrochemical industry, and with republic ministries of ferrous metallurgy, geology, health care and the food industry.

After the 25th CPSU Congress, on the initiative of the Ukrainian Academy of Sciences and the Moscow Motor Vehicle Plant imeni I. A. Likhachev, a new organizational form was created for research and application--comprehensive scientific-technical and socioeconomic programs of projects of institutes of the Ukrainian Academy of Sciences and major enterprises and production associations. They include the association Artemugol', the Krivoy Rog Mining and Ore Dressing Combine, etc.

With the help of the Ukrainian Academy of Sciences the laboratories of sectors and industries are being organized to conduct basic research along lines necessary to the national economy.

Conclusion of contracts concerning socialist collaboration between the institutes of the academy and individual enterprises is widely practiced in our academy as a means of speeding up the use of completed research. These contracts now number more than 1,300. Every year the Ukrainian Academy of Sciences fills more than 3,000 business contracts with organizations and enterprises of other ministries and departments.

The activity of the Ukrainian Academy of Sciences to make scientific research more effective and to reduce the time required to apply its results to practice was commended in 1976 by the CPSU Central Committee and was highly praised in the address of L. I. Brezhnev, general secretary of the CPSU Central Committee and chairman of the Presidium of the USSR Supreme Soviet, in a meeting with the presidents of the academies of sciences of the socialist countries in 1977.

The academy's scientists, as they have strengthened the relations between science and production, applied about 3,000 projects in the country's national economy in

the years of the 10th Five-Year Plan; the economic benefit exceeded 1.5 billion rubles and was 1.6-fold greater than during the previous 5-year period.

The achievements of our academy's scientists in conducting scientific research projects and in strengthening relations with production resulted in large part from the attention constantly paid the development of science by the Ukrainian CP Central Committee and its Politburo. Oblast party organizations, which are participating directly in conclusion of contracts between the Ukrainian Academy of Sciences and the republic's oblasts, are displaying a great deal of activity and initiative in the area of application of scientific advances. These contracts have become one of the factors for speeding up scientific-technical progress and a means of intensifying the activity of industrial enterprises located within the respective oblasts.

An important place is being given to our academy's scientific centers--the Dnepropetrovsk, Donetsk, Khar'kov, Western and Southern--which are organizing and coordinating basic and applied research in order to speed up the economic development of their respective regions. They have imparted a strong purposiveness to the efforts of scientists and production personnel along very important lines of scientific-technical progress.

The close contacts which have been established between USSR Gosplan and the Ukrainian Academy of Sciences have had a beneficial effect on further development of scientific research on behalf of the country's economy and on expanding the scale of practical application of its results. Our academy and its institutes are taking a direct part in the joint drafting and subsequent fulfillment of a number of nationwide scientific-technical programs.

The exhibition organized by USSR Gosplan of achievements of the Ukrainian Academy of Sciences in the field of agriculture, which was visited by leading officials of the USSR Council of Ministers and other distinguished party and government figures, played an important role in making the developments of our scientists known. Some of the advances which were on display have already been applied in practice. For instance, with direct support from USSR Gosplan a program has been prepared for using nitrogen systems to chill and freeze farm produce. Under the direction and with the direct participation of USSR Gosplan work has been done to introduce in various regions of the country 31 production lines for manufacturing fruit powders from waste. These lines will be able t process more than 50,000 tons of berry extracts and will afford the possibility of obtaining more than 10,000 tons of berry powder per year in the 11th Five-Year Plan.

USSR Gosplan has been extending considerable aid to the Ukrainian Academy of Sciences in expanding capital construction.

Strong businesslike relations have been established between our academy of sciences and Ukrainian Gosplan. With its active participation 42 republic programs have been drafted for solving very important scientific-technical problems in the 1981-1985 period. A list of these programs was approved in July 1980 by joint decree of the Ukrainian Academy of Sciences and the republic's gosplan.

Difficulties and unresolved problems constantly faced by the institutes of the academy of sciences are adversely affecting the process of applying the advances of science and ultimately the rate of scientific-technical progress. Since science, which has become a productive force, is also one of the productive sectors, it would be advisable if USSR Gosplan were to adopt the procedure for furnishing scientific institutions experimental facilities, the necessary materials and components so that they would enjoy at least the same status as the leading sectors of the economy.

The difficulties are especially large in material and technical supply of cost-accounting organizations of the academy, in which scientific-technical innovations are taken to the stage of series production. These organizations belonging to the pilot production capability of science do work for us worth 170 million rubles per year. But up to now they have not enjoyed centralized supply and have been compelled to resort to self-sufficiency through direct relations with interested plants, which often also lack the materials and components they need.

Increasing the scale of utilization of the advances of science and also the success of the scientific-technical revolution as a whole depend not only on scientists, but indeed on all participants in social production and all units of the economic mechanism.

However, experience demonstrates that application of progressive processes and progressive technology are rather often held back by shortcomings in planning, manifested in the fact that state plans do not make the stage of applying technical innovations in sectors and industries obligatory. Adjustment of plans so as to take into account the application of the most recent advances of science and technology would substantially speed up technical progress in the economy. Those items of the plan must, of course, be backed up with the respective material and technical supply, the creation of reserve capacities, and measures for reconstruction and modernization of existing enterprises linked to plans for development of science and technology. It is also very important to take into account all the social aspects: timely training of skilled personnel for the new directions in production, construction of housing for them, preschool institutions, schools, and enterprises for cultural and consumer services, and providing transportation.

In our time there is no aspect in the life of society which has not to some extent experienced the beneficial impact of present-day science. Soviet scientists, working in honor of the 26th congress of the party of Lenin, have by their selfless creative work been constantly augmenting its achievements and have been making a large contribution to speeding up scientific-technical progress. They are constantly expanding the front of scientific research, fighting vigorously to apply its results to practice as fast as possible, and enhancing the role of science in the construction of communism.

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AGANBEGYAN PRESSES FOR NEW TECHNOLOGY TO IMPROVE LABOR PRODUCTIVITY

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[Article by Academician A. Aganbegyan, director of the Institute of Economics and the Organization of Industrial Production, Siberian Department, USSR Academy of Sciences, Novosibirsk: "Labor Productivity and Scientific-Technical Progress"]

[Text] Until recent times the economy of the USSR developed primarily at the expense of bringing additional resources into production, including basic capital, capital investment, raw materials and other materials, labor, and, to a lesser extent, at the expense of improving the utilization of resources: increasing the return on capital and the effectiveness of capital investment, reducing the materials content of products, and increasing labor productivity.

At the dividing line between two decades, a question has been put before the economy of the country: whether to travel the path of intensive development and thereby support high rates of economic growth and provide a further rise in the level of life of the Soviet people or to travel the path of significant reduction in the rates of economic development and, correspondingly, a stabilization at the level of life already achieved. The Communist Party, naturally, has chosen the first path. At the October (1980) Plenum of the CPSU Central Committee, it was confirmed that intensification of civil production is the core of the party's economic policy. In a speech at the plenum, Comrade L. I. Brezhnev stressed that, in the 1980's, the economy must be put completely on the track of intensive development. The key summary indicator of increasing effectiveness of production and getting the economy on the track of intensive development is accelerated growth in labor productivity.

Looking upon higher labor productivity in the final analysis as the primary and most important achievement for victory for the new social order, V. I. Lenin revealed and ascribed a determining role to this indicator in the development of a socialist economy. Under present conditions, it is labor productivity that has a decisive role in achieving the highest aims of the CPSU economic strategy -- the guarantee of a steady rise in the material and cultural level of the life of the people and the creation of better conditions for all-round development of the personality.

The question of steady increase in labor productivity is now unusually critical. In the CPSU Central Committee draft for the 26th CPSU Congress "Basic Directions for the Economic and Social Development of the USSR for 1981 to 1985 and for the Period to 1990," it says with all candor that in the field of raising the effectiveness of

production, the growth of labor productivity has not been as successful as had been indicated by the plan. With these conditions, the fundamental task stands before our economy in the 11th Five-Year Plan of achieving a breakthrough in labor productivity growth rates in all branches of the economy.

Whereas, in the last five-year plan, three-fourths of the growth in national income was achieved through increasing labor productivity, 85 to 90 percent of the growth in the 11th Five-Year Plan is contemplated from this factor. Such an increase in the role of labor productivity is tied to a significant degree to the long-range decline in the growth of labor supply due to demographic changes. For the first time in the country's history, we have to achieve a larger part of civil production growth from increasing labor productivity. For many branches of the economy and for many regions, this will be the only source.

In order to achieve significant acceleration in the growth of this key indicator of rising production effectiveness, it is necessary to introduce sources and potentials for conserving labor in all sectors of the economy and to promote labor-saving policies persistently and consistently.

TOWARD HIGHER-LEVEL TECHNOLOGY SYSTEMS

In the strategic plan, the chief source of growth in labor productivity is scientific-technical progress. In our Institute of Economics and the Organization of Industrial Production of the Siberian Department of the USSR Academy of Sciences, the idea is being developed that there are two components of scientific-technical progress. The first of these is the broader and bolder application of existing technology and also its improvement. In practice, the largest amount of attention is still given to this component. The distribution of existing machines and mechanisms, increase in their capacities, increase in durability, and improvement in other technical and economic characteristics, undoubtedly have their effects. But it is important to assess the scale of these effects: labor productivity usually rises by 5 to 10 percent, sometimes by 20 to 30 percent.

The use of this first component of scientific-technical progress is well illustrated by our coal industry. Here, technical policy for a long time has been directed chiefly at distributing existing machinery, mechanisms, and technical complexes and to the improvement of old technology. Labor productivity in coal extraction has grown slowly and, in the years of the last five-year plan, was allowed to go down. Even in the Kuzbass, where mining and geological conditions are not growing any worse, labor productivity has scarcely increased at all.

The second component of scientific-technical progress is the transition from existing technological systems to systems of a higher level that achieve substantial changes in the growth of labor productivity. As a matter of fact, change in technological systems and the transition to new technical principles in production, based on the latest achievements of science, constitute the essence of the scientific-technical revolution.

In the coal industry, a truly revolutionary transformation is taking place, for example, with the replacement of dry-mining by hydraulic extraction, which is permitting a sharp rise in the growth of labor productivity. The increase has not

been by a few percentage points but by several times over. Today, labor productivity at the usual Kuzbass mine is about 73 tons per worker per month, but with hydraul extraction it is double that. At the largest hydraulic mine "Yubileynaya," labor productivity is triple the average level. The main thing is the great potential of the new technology. The contrast is even more striking if one examines the dynamics of labor productivity in ordinary mines and hydraulic mines. In the former, it sometimes goes down but, at the latter, it rises constantly and confidently. Under such conditions, the policy of the USSR Ministry of the Coal Industry is surprising: all of its attention is given to improving old technology while, simultaneously, it constrains the development of hydraulic coal extraction.

But take electronics. The first generation of electronic systems was based on radio vacuum tubes. Each year they were improved and became cheaper to produce. But when their limitations became obvious, a technical revolution took place -- the transition to the second generation of electronic systems based on semiconductors. And here there was room for improvement, but that room was soon essentially used up. And then came a new technical breakthrough -- the transition to integrated circuits. The degree of integration grew rapidly. The application of large-scale integrated circuits (LSI) improved the basic parameters of electronic systems dozens of times over and made it possible to solve conceptually new tasks.

This example clearly shows that if we stay too long at one position and put all our basic efforts and resources on the first component of technical progress, like the improvement of electronic tubes or semiconductors, then a lag in that economic sector will be unavoidable.

The complexity of the present period in the acceleration of growth in labor productivity consists of the necessity to conduct a policy directed toward simultaneous savings in labor, capital, energy, and materials, for the enlistment of additional resources is limited by all these parameters. As is known, in the 11th Five-Year Plan, reconstruction and the technical re-equipping of operating enterprises is being given wide scope. It is becoming a leading trend in the growth of basic resources. In the draft by the CPSU Central Committee, it is stated: "To direct capital investment in first priority to the reconstruction and the re-equipping of enterprises."

It must be kept in mind that the distribution and improvement of just existing engineering and technology, providing some growth in labor productivity, is not always accompanied by lowering capital output or savings in fuel, raw materials, and other materials. Radical improvements in all directions in raising the effectiveness of civil production usually produces technology based on new principles. As a rule, this technology involves fewer operations and less waste. Therefore, in carrying out the reconstruction and the technical re-equipping of an enterprise, it is imperative that the specific circumstances be taken into account.

For example, the hydraulic extraction of coal provides not only a high level of labor productivity, but also lowers specific capital investment by 20 to 30 percent. The reason is that the movement of coal by water eliminates the need for such wide working spaces, as for piling coal on cars, or such large shafts for delivering coal to the surface: the coal is brought up through pipe. Here, a substantial saving of materials is achieved, since it is unnecessary to timber up the mine working spaces.

The progressiveness of continuous steel casting, which occurs at the stage where steel is poured into molds, is well known. Labor productivity in metallurgy is growing many times over from this, because the labor in preparing molds, in pouring steel into them, and knocking out ingots is eliminated. At the same time, capital expenses are reduced insofar as facilities for continuous steel casting cost one half to two-thirds as much as a shop with old technology using molds. There are substantial savings of metals and fuel. In many instances, the need for blooming is eliminated, because the metal, after continuous casting, goes at once into rolled steel. It should be added that the properties of the metal are improved with continuous casting, particularly its hardness, which provides great savings in the utilization of machinery.

It is a rule that engineering and technology of a high level are characterized by greater reliability in comparison with ordinary engineering and technology. Semiconductors, for example, are more reliable than vacuum tubes and, according to this indicator, integrated circuits are much superior to semiconductors. The reliability of hydraulic coal extraction is immeasurably superior to that of dry mining, especially with the use of bunkers that provide uninterrupted work by different shifts of workers.

The new technological systems have the greatest effect in cases where they encompass not a part but a whole production process, including auxiliary and service work. The continuous casting of steel itself is especially effective when it forestalls the production of steel in converters, and is accompanied by continuous rolling. Then, a unified technological flow is created, with a high degree of productivity and effectiveness.

Science and world experience has made huge gains in transferring various types of production to technological systems of a higher level. It is chiefly a matter of organizing construction, planning, and introduction of these systems. Insofar as the creation of any of them require the efforts, as a rule, of many branches of the economy, the most practical route to the objective is the accomplishment of complex single-purpose programs for scientific-technical progress.

A broad transition to scientific-technical programs is provided for in the draft Basic Directions for the 11th Five-Year Plan and for the period to 1990. Their consequent accomplishment promises, without question, a great economic effect. One would think that in the draft it would be more effective to stress that organizational forms of management should also be subordinated to special-purpose program planning in the field of scientific-technical progress. In our opinion, it is necessary to create a structure built on the special-purpose principle and responding to the development and introduction of technological systems of higher level. We can object to this: they say, we already have such organizations. This is not entirely so. And this is easy to illustrate.

It is sufficient to return to the coal industry. Any coal scientific-research institute simultaneously works on no less than ten different subjects. People work on each of these pretty well. And the end results in the coal field served by a given institute are more than modest. The individual achievements just somehow do not add up to overall success.

And now let us imagine another picture: in connection with a coal institute, a scientific-production association is created with scientific, planning, and design elements, an experimental plant, and a group for technology introduction. Under the management by the association, reconstruction and new construction of individual mines takes place, research and planning-design projects are conducted, experimental equipment for mines is prepared, and a new technological system is introduced into practice. Of course, the scientific-production association, as the prime contractor, enters into mutual relations with many other organizations, but it bears the responsibility, and it alone. And the technological system developed by the association is finally introduced at the reconstructed mine. The result of the work is at hand and it can be measured: you only have to go to the mine and see what the level of productivity is, what kind of specific capital investment, what kind of expenditures of energy and materials, working conditions, and so forth.

Let us say that such an association, created at the Kuznetsk Scientific-Research Coal Institute, brings the technology put at its disposal up to a productivity of 250 tons per month per worker, which exceeds the present level by a factor of three. A state commission approves the new technology and makes a decision to diffuse it. Henceforth, no mine under suitable mining conditions can be built or reconstructed with a level of labor productivity less than that actually achieved. The equipment which will be manufactured at the experimental plant will be turned over to coal machine-building plants for series production, and the old, less productive equipment will be taken out of production.

And what else does a scientific-production association do? It develops and introduces a technological system of a still higher level for new mines, embodies those ideas that were being researched yesterday in the scientific element of the association and today are already the object of plans and designs. With such an approach to changing technology in the coal industry, significant acceleration of the growth rate of labor productivity could be provided.

Why do we go into so much detail about examples from the coal industry? It is that it consistantly fails to fulfil plans either in volume of production or in growth of labor productivity.

In the draft Basic Directions, an indicator for labor productivity is not designated for the coal industry, in contrast with other branches of the economy. But insofar as the growth in coal extraction must be provided basically by raising labor productivity, it must surely grow by approximately 10 percent. To achieve a higher indicator, it is necessary to go decisively to a new -- hydraulic -- technology for coal extraction. We are deeply convinced that efforts in this direction will be repaid generously.

The draft entirely correctly speaks of the necessity for improving the management of scientific-technical progress and the development of a network of scientific-production associations. It happens that the accomplishment of this task is largely tied with the transition to scientific-technical programs for the development and distribution of complex technological systems of a higher level in place of existing ones (to a significant degree by technical reconstruction of operating enterprises) and by creating scientific-production associations according to the special-purpose principle.

ON THE ROAD TOWARD REDUCING MANUAL LABOR

In connection with the examination of programs for technical progress, I would like especially to focus attention on the very great potential for raising labor productivity provided by the reduction in number of workers who do manual labor. In industry, at present, such workers are about half, in construction -- over half, and in loading-unloading work and trade -- over 70 percent.

Manual labor, as an example, is widely used in repair and maintenance work in all branches of the economy. Paradox: today, more workers are occupied in repair and maintenance than in the production of machines and equipment. Is it possible to make radical changes in this situation that has come about? In our view, it is possible. To do this, it would be advisable to apply special efforts to increase the reliability of machinery and equipment and at least to double the retirement rate of old technology which works poorly and is constantly being repaired. And, finally, the field of maintenance and repair should itself be reorganized.

We sometimes ponder the thought that, if you take the whole utilization cycle of some piece of machinery, say an automobile, tractor, or machine tool, the expenditure for its manufacture constitutes only a small percent of the total expenditures for creating and exploiting it during its "life cycle." More than nine-tenths of the expense involves servicing and repair. Thus, from the point of view of achieving the best economic results, the main point is reducing total expenses and not just lowering the cost of producing a given item.

One would think that we should re-examine our approach to machinery and equipment from an economic position, having taken as a basis the ratio of expenditures for production and for servicing.

Perhaps it would be advisable to entrust the repair and maintenance of machinery and equipment gradually to those enterprises and associations that produce them. In this way, repair and maintenance will be centralized and feedback will be established between maintenance and production. It is evident that such a measure is worth mentioning in the draft Basic Directions. Its high degree of effectiveness is demonstrated by the experience of such enterprises as the Volga Automobile Plant, the Minsk Tractor Plant, and the Vilnius Field Machinery Plant imeni the 50th Anniversary of the USSR. And this is not surprising. For example, capital repairs to a truck require double or triple the labor put into its manufacture. The utility of a reconditioned automobile is roughly one-third that of a new one. It is understandable that if those who make the machines are involved with maintenance, the possibilities for increasing the periods between repairs will be found sooner.

Another extremely large category of workers doing manual labor is utilized in loading and unloading and transportation. The large possibilities for reductions in this category are evidenced by the experience of enterprises in the motor-vehicle industry, particularly at the Moscow Automobile Plant imeni I. A. Likhachev, but also in tractor and agricultural machine building.

Broad mechanization is restrained by the lagging production of appropriate technology, especially loaders. Despite existing solutions, the construction of a large complex for the production of loaders has not yet been developed. It would be use-

ful to recall this in the draft Basic Directions. Such products could help save the labor not just of tens and hundreds of thousands, but of millions of people engaged in heavy and poorly skilled labor.

Still more must be said on this subject, in our view. Auxiliary and service elements of enterprises and organizations in many instances operate essentially as handicraft shops, and here a large number of workers are doing manual labor. Much is discussed in the press about the necessity of a unified course for centralization in the production of tools, hardare, parts, forgings, and control and measuring apparatus. But very little has been done in this direction. There is no agency that would completely concentrate on the production of products for interagency purposes. Only three percent of all prefabricated parts used in machine building plants are manufactured centrally. Each enterprise in such a situation strives to expand its auxiliary small-capacity service. As a result, the capital and current expenditures for these purposes exceed by a factor of two or three the resources needed to create highly mechanized and centralized production.

The analysis of reducing the number in auxiliary and service spheres must be approached broadly. If you take an individual economic sector or an individual enterprise or organization, it would not seem so bad: auxiliary and service labor occupies 40 to 50 percent of the workers, but still half of the people are doing the basic work. But you find a different result if you look at the subject from the point of view of the national economy and of relationships between economic sectors. Many enterprises and whole economic sectors themselves have an auxiliary or service character. Take the Central Ob' region, where practically everything is geared to petroleum extraction. It would seem that most of the workers would be involved in petroleum extraction. But their proportion in the total number of workers is no more than a few percent, for more than nine-tenths are those who support their work.

A large group of scientists and specialists are involved seriously and consistently with labor productivity among oil-field workers. Oil wells are being put on remote control and the most up-to-date automatic and telemechanical equipment is being introduced. At the same time, say, at Surgut, more than fifteen labor supply sections operate under various ministries. Each of them has its own bases, its own automobile transportation, and its own stores and dining facilities. In these sections no fewer people work than in petroleum extraction, but practically no one is involved in the productivity of their labor.

At the 25th CPSU Congress, there was justified criticism of the organization of operations in Western Siberia where the river flotillas of various agencies operate, most belonging to construction and supply organizations. Unfortunately, from that time to this, little has changed. But the number of organizations (construction, supply, and transportation) has grown. I would like to stress again: if you look at an existing situation from the point of view of the national economy, you open up great new potentials for specialization and concentration and, on this basis, possibilities for radical reduction in the number of auxiliary and service shops. At the same time, the productivity of civil labor will be substantially increased.

Serious attention to reducing manual labor is provided for in the draft Basic Directions. The draft provides for developing a special national state complex program

for the mechanization of manual labor. Important meaning in its accomplishment will be attached to the measures outlined in the well-known decree by the CPSU Central Committee and the USSR Council of Ministers on improving the economic mechanism, particularly the introduction of a new plan indicator for enterprises -- the task of reducing the number of workers occupied in manual labor.

In the matter of providing true growth in labor productivity, the question not only pertains to the mobilization of the potential relating to the acceleration of scientific-technical progress and the application of its results in practice. The party, in the draft Basic Directions, approved and supported by all the Soviet people, also aims toward effective utilization of organizational, economic, and social possibilities. Here also, are not only improvement in planning, but also improving the whole economic mechanism, the expansion of socialist competition, and constant increase in workers' motivation. All of these potentials and possibilities must be realized in complex and close mutual relationship.

9645
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ACADEMY VICE PRESIDENT VELIKHOV PRAISES SOVIET-AMERICAN COOPERATION IN THERMONUCLEAR RESEARCH

Moscow LITERATURNAYA GAZETA in Russian No 1, 1 Jan 81

[Interview with Academician Ye. Velikhov, vice-president of the USSR Academy of Sciences, by A. Lepikhov and B. Smagin: "Approach to Thermonuclear Energy"]

[Text] Today, it has become obvious that the epoch of easily accessible energy resources is ending. That is why in many countries the search has been expanded for new sources which could satisfy all man's growing demands for energy. Now that atomic electric stations have proved themselves, great hopes are being placed on thermonuclear synthesis.

This possibility, which is becoming still more real through the efforts of scientists, is being considered in the CPSU Central Committee draft "Basic Directions for the Economic and Social Development of the USSR for 1981 to 1985 and for the Period to 1990." Among the most important problems that require the concentration of effort, the draft lists the following: the development of nuclear energy and the creation of foundations for thermonuclear energy.

The implementation of the program for controlled thermonuclear synthesis in our country is being managed b y the vice-president of the USSR Academy of Sciences, Academician Ye. Velikhov. Today, we publish an interview with him by our correspondents.

[Question] Yevgeniy Pavlovich! What place do scientists allot to thermonuclear energy in the future of energy?

[Answer] The forecasts by specialists give first place to atomic energy and to coal . . . The role of thermonuclear energy will steadily grow.

[Question] What has already been achieved in this direction?

[Answer] During the past decade we have witnessed yet another triumph of Soviet scientific-technical thought: worldwide recognition of a leading contender in solving one of the most difficult problems of the century -- the attainment of

controlled nuclear synthesis -- a magnetic system, proposed and developed in the USSR and named by us "Tokamak."

Before approaching the solution of this problem, we had to create a new branch of physics -- the science of plasma. Although the idea of plasma as the fourth state of matter arose at the beginning of this century, our present knowledge goes back a little more than two decades. During these years, we lived through a time of intense optimism, then a period of deep slump, and now we find ourselves at that stage of research where at least one system suitable for accomplishing thermonuclear synthesis -- the Tokamak -- is envisaged in its basic characteristics right up to the creation of a thermonuclear reactor.

What have we accomplished today, then? It is already possible to sustain a steady plasma state for the duration of a second. I point out that this is a long duration in terms of the thermonuclear time scale. We know how to make a plasma "filament" work still longer. But for this, we must solve several technical problems. They are still not solved, although, once again, we know how it can be done. It is therefore a question of time.

It is also very important to apply high pressure and temperature to the plasma: without this, thermonuclear reaction cannot begin. We have already studied how to achieve the necessary pressure. We are also close to fulfilling the second condition. The plasma can now be heated to 80 million degrees (very close to the hoped-for 100 million). Good results have been achieved at Princeton University, using supplemental heating elements in the Tokamak. By the way, we also are fully mastering such means. And that high level of achievement that has been established in the United States is the result of the international division of labor that exists in this field. Various research collectives concentrate their efforts on the solution of different problems. As a whole, conditions are created for increasingly rapid total movement forward.

[Question] Is it possible to talk about the length of time it will take to implement the Soviet program for controlled thermonuclear synthesis?

[Answer] Yes, it is possible.

First of all, we must examine how plasma behaves under conditions approaching those of a reactor. And doing this permits a new generation of Tokamaks. Such a device, the Tokamak-15, will be built during the next five-year plan. The construction is remarkable because it has a superconducting magnet system. In a real reactor, superconductivity is exactly what is needed to avoid losses in supporting the magnetic field which otherwise could be greater than the energy being produced. And we have accumulated experience in exploiting such a system with the Tokamak-7, on which we have been working successfully for a number of years.

And I hope that somewhere in the middle of the future five-year plan or, let me speak more cautiously, by its end, thermonuclear reaction will have been demonstrated. That is, we will learn how to light the "fire" in the thermonuclear "furnace." Then we will also see how one works.

In the following, 12th, Five-Year Plan, it is planned to demonstrate the technical accomplishment of controlled thermonuclear reaction. And this is nothing else than the creation of the foundations for thermonuclear energy. After this, an agenda will contain problems relating to the construction of thermonuclear reactors.

Thus, perhaps, not very effective superficially, but with thoroughly substantiated development, we can build within 15 to 20 years the first thermonuclear electric power station, which will provide commercial current.

[Question] How much do we know about research in the field of thermonuclear synthesis other than that on devices of the Tokamak type?

[Answer] To be sure. The second direction that has been confirmed is that of microbursts. The theory predicts that to accomplish thermonuclear microbursts suitable for use as an energy source, you need to bring to the surface of a thermonuclear target -- so that it will be compressed very rapidly and further "ignite" -- a power of about 10^{14} watts. This can be done with the aid of lasers in a billionth part of a second. Such work is done basically at the Physics Institute imeni P. N. Lebedev. The "ignition" of the initial substance is supposed to take place through extremely short (billionth part of a second), but powerful impulses of light. But at the Institute of Atomic Energy imeni I. V. Kurchatov, they have gone another route. In recent years, scientists have been successful in creating very powerful energy-storage devices using capacitor banks and, as a dielectric, highly purified water. From this has arisen the name applied to a system currently being built, the "Angara." A number of interesting ideas have been proposed that permit hitting the target with energy on the scale of tens of millions of joules for one ten-millionth of a second.

There are also other interesting ideas. But from an engineering point of view these are less developed than the Tokamak is. And we, it must be said, are not now very worried about this. The chief task here is something else: we must understand well the physical principles of the processes taking place, which are unusually interesting. Among the projects that we intend to do during the next five-year plan will be the selection of the most effective means for accomplishing thermonuclear microbursts.

As a whole, the trend is very promising. It promises us a "thermonuclear combustion engine." After making a very simple chamber, in which periodic microbursts will take place, one can create for various uses a device of very high efficiency.

But, I repeat that today it is to the Tokamak that we associate engineering and practical feasibility for achieving thermonuclear energy.

[Question] You mentioned international cooperation in thermonuclear work. Please tell us in more detail about this.

[Answer] The mastery of thermonuclear synthesis involves a huge undertaking, the accomplishment of which is hardly possible without broad international cooperation. Today, about 50 Tokamaks have been built that have required billions in expenditures, the development of very complicated technical devices and, of course, the intellectual energy of many talented researchers.

Incidentally, the very selection of the Tokamak as the excellent basis for research on thermonuclear synthesis is a clear example of the fruitfulness of such cooperation. The successful principle, found and substantiated in our country, served as a powerful stimulus to work on thermonuclear synthesis throughout the world (concerning this, it is not out of place to recall this now, when in the West they are reiterating that cooperation with "those perfidious Russians" is a one-way street).

The triumphal march of the Tokamak continues. In the United States now they are building on this basis, an experimental reactor which should be assembled by the end of 1981 at Princeton University. West European countries have combined efforts to create a common Tokamak. In Japan a system is being constructed with the name Tokamak-60. In September last year, the United States, by legislative action, adopted a National Thermonuclear Program, which exceeds the man-on-the-moon program in size and which should end with the creation at the close of the century with an electric power station based on Tokamak.

Tokamak, evidently, is one of the simplest and most hopeful schemes for thermonuclear containment, in which at its present state can be envisaged an operating thermonuclear reactor. It is being discussed in detail not only by specialists in individual countries but also by the International Council for Thermonuclear Research, which operates in Vienna under the International Atomic Energy Agency (IAEA). The conclusion is unanimous: there is still no alternative.

In 1978, the Soviet Union introduced a proposal to the IAEA: to unite the efforts of scientists from all countries to create an international Tokamak. This would be the best way to bring together all the merits of presently existing Tokamak designs. The proposal was adopted and now work on the project for an international thermonuclear Tokamak reactor "Intor" is successfully developing. It is true that a place has still not been found for its construction, although the Soviet Union, Austria, and other European countries have already offered their own territory.

It seems to me that the realization of this international project, where "everyone works for all" will be a clear display of the materialization of detente, the only condition under which world science can really be developed fruitfully.

9645
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'CODE OF BEHAVIOR' IN INTERNATIONAL TECHNOLOGY TRANSFER ADVOCATED

Moscow AZIYA I AFRIKA SEGODNYA in Russian No 1, 1981 pp 13-15

[Article by V. Mal'kevich, candidate of engineering sciences: "For a Just System of International Technology Transfer"]

[Text] In the second half of the 20th century, a dynamic development of the process of international technology transfer is taking place: the growth rate in the exchange of licenses alone has exceeded the growth of international trade as a whole by a factor of three. This process includes the transfer of innovations, the results of scientific research, systematized knowledge and experience for the production of hardware, familiarization with new technology, or provision of services, including management and marketing.

Under the conditions of the present-day capitalistic market, technology transfer at the very outset became an instrument of imperialistic expansion in the world arena. Monopolies widely utilize technology transfer as a means for extracting superprofits from dozens of countries, especially those of Asia, Africa, and Latin America, and as a means for strengthening their position and privileges in the capitalistic world economy.

The inequality, discrimination, monopolistic restrictions and controls that are present throughout the imperialistic system of international economic relations are fully manifested in the field of technology transfer. Here, in especially sharp relief, one can see the deceitful role of present-day international monopolies -- the multinational corporations. On the one hand, the multinationals are bearers of advanced technology. They conduct the latest research and make effective developments, they organize large-scale production of high-technology goods, and they transfer technology to dozens of countries. On the other hand, however, the multinationals subordinate the development of technology and its application on the scale of the total worldwide capitalist economy to their own interests.

With the external economic expansion of the monopolies of leading imperialist powers by creating overseas branches and establishing control over local companies, international technology transfer is increasingly coming into the sphere of the internal corporate channels of the multinationals, that is, of the channels of communication between company heads and foreign links of the multinationals. Judging this process by the dynamics of licensing transactions, the share of transactions by branches of multinationals in the U.S. in the total sum of payments for licenses in 1970 was 67 percent. By 1977 the share had grown to 80 percent.

In the total international license trade, about three-fourths are internal corporate operations. Thus, this must be considered the main channel for technology dissemination in the capitalist world. And it is this that allows the multinationals to impose the direction of development on production and on whole branches of industry on a country and to apply numerous discriminatory restrictions.

For example, the basic regions for the application of American technology are countries in Southeast Asia and Latin America. As analysis shows, U.S. multinational corporations transfer to Southeast Asian countries (Malaysia, Singapore, and others) technological processes that require wide-scale application of manual labor. As a rule, this involves the production of radio and electronics components and precise mechanisms which are then for the most part reshipped to the United States or other countries where these multinationals operate.

In most instances, international monopolies leave only 15 to 30 percent of the technology being transferred, to independent national companies, and the rest they keep in their own hands and use at their own discretion.

Recent years have seen a more intense growth in inequality, discrimination, and dictatorial control in the international capitalist exchange of technology. Many bourgeois researchers have been forced to recognize this. For example, the British journal "The Economist" writes, in an article, "Control over Multinational Corporations," that multinationals "transfer obsolete technology to countries of the Third World. In other instances, they deliver technology that is too advanced. They overpay. They underpay. They fight local companies with all their resources..."

By transferring technology through their foreign branches, the multinationals preserve actual rights of ownership, raise the price, and widely apply all possible restrictive conditions. An especially unequal situation has come about in the international transfer of technology from imperialist states to developing countries.

By acquiring Western technology, young states actually receive certain up-to-date technical knowledge and types of equipment. At the same time, however, the technological dependence of these countries on imperialist states is stren gthened. The flow of technology to developing countries is usually too small in volume, the cost of the technology substantially burdens the national economy, and often it is not appropriate in terms of local possibilities. In addition, the conditions for technology transfer reduce its significance for economic development as a whole and often have an unfavorable influence on the formation of a national technological potential.

The unfavorable position of the countries of Asia, Africa, and Latin America in acquiring technology is explained not only by the weakness of the independent local companies, but also by the fact that the larger part of the technology comes to them through the communication channels of the multinationals, that is, from the mother companies to their branches in one developing country or another. In this connection, in the technology transfer agreements there are a large number of restrictive conditions. They can be either fixed in the agreements or contained in unofficial (but nonetheless binding) understandings between companies of developed capitalist countries and their foreign off-spring enterprises and branches. In a piece of research by the Secretariat of the UN Conference on Trade and Development, it is

pointed out that in selective analysis of 2640 contracts in 12 developing countries, 22 types of restrictive conditions were found that were stipulated by technology suppliers. Among these were restrictions relating to exports, restrictions relating to sources of deliveries, requirements for guarantees against changes in taxation, opposition to the training of local personnel, etc.

The development of international economic relations urgently requires normalization in the sphere of technology transfer in the interests of all groups of countries. This problem began to be more acute in the 1960's with the expansion of the scientific-technical revolution, the increase in the influence of socialist countries, and the upsurge of opposition by developing countries to neocolonialism. At the same time, anxiety has been building up also among the so-called little capitalistic countries about the growth of abuse by the monopolistic giants of the West.

Problems in technology transfer have been discussed by a number of international forums. In 1961, the UN General Assembly approved a resolution which provided for the preparation of a report devoted particularly to the influence of patents on the economies of poorly developed countries, the assimilation of new products and techniques by poorly developed countries, and the improvement of the productivity of their economies.

The heads of states and governments of the nonaligned countries at their 4th conference in 1973 in a joint declaration called for "access to up-to-date technology and for the adoption of an international Code of Behavior for regulating technology transfer from developed countries to developing countries."

Considering the urgent necessity for accelerating the rate of social and economic progress in developing countries, the UN General Assembly at its 6th special session (1974) adopted the "Declaration on the Establishment of a New International Economic Order," which must be based particularly on "the provision to developing countries of access to the achievements of up-to-date science and technology and cooperation for the transfer of technology and the creation of local technology in the interests of developing countries in those forms and in agreement with those procedures that are appropriate to their economies." At this same session, a "Program of Action for the Establishment of a New International Economic Order" was adopted. This program contains statements on the necessity for developing an international Code of Behavior in the field of technology transfer, corresponding to the needs and conditions that prevail in developing countries; it also calls for the adaptation of the commercial practice that regulates technology transfer to the needs of developing countries, and for the avoidance of the misuse of suppliers' rights.

Being among the initiators in calling together the UN Conference on Trade and Development (UNCTAD), the socialist countries advocated, even at its first session, the basic principles of international economic cooperation which led the way for radical restructuring of international economic relations, including those in the field of technology transfer.

From the very time that the question of the necessity for creating an international document to regulate technology transfer was first raised, the socialist

countries* were in favor of creating a universal and effective instrument for restructuring the unjust and unequal relations in this field. They proceeded from the necessity for adopting radical measures rather than partial changes or declarative pronouncements that in operation could mean only the preservation of the existing status.

The developing countries, proceeding from the necessity for thorough restructuring of technology-exchange relations, along with just and necessary policies, often bring up excessive demands in striving to introduce the international Code of Behavior in the Field of Technology Transfer (hereafter referred to as "the Code") as a document being created only in the interests of the developing countries. In addition, the interests of these countries, because of their political, economic, and geographical policies, often do not coincide and, as a result, the group as a whole exhibits inconsistency and an inclination to change declared positions. All this weakens the possibility for their joint action with socialist countries and for the efficacy of work on the Code.

One of the basic aims of the Code is the establishment of general and just standards, which should be the basis for mutual relations between parties in technology transfer deals and between the respective governments with consideration for their legal interests and with due recognition of the special needs of developing countries for achieving the aims of their economic and social development.

Taking into account that the fundamental interests of socialist countries and developing countries in making the whole system of international economic relations more healthy largely coincide, the socialist countries actively support the just demands of the developing states, particularly on such questions as the determination of "restrictive practices" in technology transfer, the granting of special conditions to developing countries, the granting of guarantees by the suppliers of technology, and others. This has allowed the socialist countries and the developing countries to take a number of joint positions.

The international Code provides for the stimulation of technology transfer agreements, including the international flow of technical information, an increase in the contributions of technology to solving the social-economic problems of Asian, African, and Latin American countries, and expansion in world production and trade as a whole.

Especially important is the inclusion in the draft of the Code, on the initiative of the socialist countries, a position on outlawing discrimination. For the present, the following text from the section "Principles" has been agreed upon: "States must work together in the field of international technology transfer to assist economic growth throughout the world and particularly in developing countries. Cooperation in such transfer must be brought about independently of any differences in political, economic or social systems. It is implied that special conditions

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* Here and elsewhere, the term "socialist countries" means the People's Republic of Bulgaria, the Hungarian People's Republic, the German Democratic Republic, the Mongolian People's Republic, the Polish People's Republic, and the Czechoslovak Socialist Republic, all of which acted as a united group at UNCTAD sessions. Other socialist countries were in the developing countries' group.

in the field of technology transfer must be given to developing countries in accordance with the positions contained in the present Code on this question.

It seems that these "Principles," after their approval, will serve not only as an important starting point for developing appropriate phraseology for documents of various UN organizations but also will aid in strengthening the general struggle for restructuring international economic relations.

A very important question regarding the Code is its sphere of application. If there is general agreement among all groups that the Code has "universal application and dissemination to all countries and groups of countries, independently of their political systems and levels of development," the task is the diffusion of the Code's effects not only to technology transfer between independent foreign partners but also to such operations of multinationals as transfer of technology from the headquarters of multinationals to foreign branches and also from these branches to local companies. The last two channels for technology transfer in particular help the imperialist monopolies in their striving to strengthen their economic influence on developing countries.

Developed capitalistic countries actively oppose such an approach, citing the principle of "the legal integrity of an enterprise," which prohibits interference in the internal operations of a company (including international companies). They also maintain that technological deals within individual countries, for example, between branches of a multinational and an independent local company, are regulated not by international but by national laws.

As the result of opposition by the developed capitalist countries, a final solution of this problem has not yet been found.

The significance of the Code, as has been pointed out, is not limited to the declaration of general progressive principles and aims. Its practical meaning will largely depend on the concrete contents of such sections as "Restrictive Business Practices" and "Guarantees and Obligations."

In fighting for a just solution to the problem of technology transfer, the socialist countries see as their task that appropriate statements in the Code exclude from technological exchange the use of monopolistic pressure on trade partners and restrict abuse by multinationals in technology transfer through internal monopolistic channels; at the same time, the socialist countries should not allow the "restrictive practices" label to be applied to the contractual conditions that are generally accepted in the external economic relations of the socialist countries and that are being applied in international technological exchanges.

This task is complicated by the fact that the positions of a group of developing countries on these statements are unstable and are inclined to change under the influence of internal opposition, and this often makes it more difficult for the socialist countries to select a general approach with them. Nevertheless, the socialist countries and the developing countries are joining together in putting into the Code the inadmissibility of about 20 types of restrictive practices by monopolies, such as restrictions on the conduct of research, the utilization of personnel, the tailoring of technology, requirements to accept supplementary

deliveries and to regulate advertising activity, demands for participation in management, and a number of others.

In the discussions on the section "Guarantees and Obligations," joint positions by socialist and developing countries permitted agreement on a number of important provisions that obligate the technology supplier to ease access to it by the party to the acquisition, such as use of local resources, full provision of information on the various elements subject to technology transfer, delivery of components and spare parts, the observance of qualitative standards, and others, and also obligations on the part of those receiving technology.

Developing countries attach great significance to the question of applicable law and the resolution of disagreements. They proceed from the belief that the standards of international law were formulated before the creation of many young states and are quite often applied against their fundamental interests. Therefore, they have insisted that the resolution of disagreements be conducted only on the basis of the rights of the parties receiving technology and, as a rule, in a court process. The socialist countries, however, have proposed an approach which gives first priority to the peaceful resolution of disagreements by means of arbitration. As for applicable law under this proposal, the "parties by general agreement can select the laws subject to the application to their contractual relations, if this is not forbidden by national law."

The legal character of the Code is one of the key questions as to its existence as an international document. The developing countries are in favor of making the Code juridically binding. Countries of the West, following their general line, are following a course in which even from a "balanced" view cannot be recognized as obligatory for the suppliers of technology. Socialist countries support the position of the developing countries on this question. The final decision on the juridical character of the document, however, can be achieved only after complete agreement has been reached.

Despite the many complications, the development of the Code as a progressive international document has reached the point where it is possible to speak of completing this work.

Reality indicates that there is urgent demand for an effective instrument for restructuring international relations in the field of technology transfer, especially applicable to the needs of the developing countries of Asia, Africa, and Latin America.

9845
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UKRAINIAN CP'S SCIENCE CHIEF DESCRIBES REGIONAL SYSTEM OF ADMINISTRATION

Kiev PRAVDA UKRAINY in Russian 20 Feb 81 p 2

[Article by F. Rudich, chief of the department for science and educational institutions of the Ukrainian Communist Party Central Committee: "A Party and State Matter"]

[Text] The development of science and the acceleration of scientific-technical progress receive a very large amount of attention from the party organizations of the republic.

Much has been done in this direction during this past five-year plan. Evidence of this is the work of the UkSSR Academy of Sciences on increasing the effectiveness of scientific research and hastening the introduction of its results into practice and on creating new technology based on fundamental research. This work has received a high evaluation from the CPSU Central Committee and from the general secretary of the CPSU Central Committee, Comrade L. I. Brezhnev. The results are most remarkable: during the years of the 10th Five-Year Plan, academy institutes introduced more than 3 thousand developments into the national economy, with a total economic effect of over 1.5 billion rubles.

The republic is persistently accomplishing the task of further improving the system for the introduction of scientific achievements into practice. The role and responsibility of UkSSR Gosplan are significant; it is the body responsible for scientific-technical progress and is called upon to participate actively in its practical management. A commission operates under the presidium of the republic council of ministers. The coordination of research in natural and social sciences is accomplished by the Republic Council, headed by the president of the UkSSR Academy of Sciences. A republic automated system for controlling the development of science and technology is effectively functioning.

Party and state bodies proceed from the assumption that, under the present demographic situation, further growth in production must be achieved largely by raising labor productivity, by more effective use of scientific achievements, and accelerating scientific-technical progress. "Only by properly working out a mechanism for relating science to production," emphasized Comrade V. V. Shcherbitskiy, member of the Politburo of the CPSU Central Committee and first secretary of the Ukrainian Communist Party Central Committee, at the 26th Congress of the Ukrainian Communist Party, "can we sharply reduce the length of time it takes for the realization of a

scientific idea -- from its conception to the serial production of new types of products. This is one of the important tasks of the UkSSR Council of Ministers, the republic Gosplan, and the presidium of the Academy of Sciences and its regional scientific centers."

The special-purpose method and the formulation of scientific-technical programs have important significance in this plan. Systems of programs are being completed on three levels: those most important to the republic, to economic sectors, and to regions. At present, those programs most important to the republic are "Energokompleks," "Metall," "Materialoyemkost'," "Agrokompleks," "Sakhar," all of which have been formulated, and the "Trud" program and programs for economic sectors are nearing completion.

The Donetsk obkom of the Ukrainian Communist Party, jointly with the scientific center of the UkSSR Academy of Sciences, has formulated four regional programs. Analogous work has been conducted in Kiev, Odessa, and Khar'kov. Programs basically have also been prepared in Dnepropetrovsk, L'vov, and in several other oblasts. As analysis shows, much work already has been done here, but there still remains quite a large area for applying effort. During the first quarter of this year, programs should be confirmed in all oblasts. It is important that tasks in these programs become an integral part of the plans for the development of economic sectors and of plans for individual enterprises. At the same time, in some places this work is only beginning. At times, there are attempts to present as programs, complex plans for scientific research and for accelerating scientific and technical progress or, the other way around, plans for the introduction of individual innovations. In themselves, such plans are a useful activity. But they do not by any means replace special-purpose scientific-technical programs directed toward the solution of regional tasks.

Here it is appropriate to recall the words spoken by Leonid Il'ich Brezhnev at the October (1980) Plenum of the CPSU Central Committee: "Each such program should be a well-grounded plan of measures, resting on precise calculations and directed toward final results and toward the complete solution of a problems. It is important that the program define the stages and sequence of the tasks being worked on. And, finally, there must be a system of control over the program, clearly establishing personal responsibility for each portion of the work and providing the necessary rights. Without all of this, a program is not a program, but a sum of good intentions."

In this connection, there is a need that there be not too many programs and that each be oriented toward a clear purpose and provide for the solution of concrete scientific-technical problems having especially important significance for the respective region. It seems that, first of all, regional tasks should be brought out at the oblast level. Special attention should be given to this, because in a number of instances there are attempts to "embrace the unembraceable," to grasp such a circle of problems that one cannot even talk about any concentration of effort or purposeful orientation. Ministries and agencies of the republic are called upon to provide active participation by their subordinate institutions, organizations, and enterprises in the fulfillment of these programs.

As experience has shown, success is assured where the special-purpose program approach is implemented. In Khar'kov, for example, the Physical-Technical Institute

of the UkSSR Academy of Sciences developed the "Bulat" facility for applying a covering that strengthens cutting tools. Here, the manufacture of individual subassemblies was organized, and then the assembly and introduction of a whole series of such facilities were accomplished at enterprises of very different ministries and agencies. In connection with this, a clear special-purpose orientation was present, and the volume and sequence of work, operational control over the process of its implementation, and cooperation of the various participants were well thought out. The introduction of a valuable innovation was carried out, under the management and control by party bodies.

Interesting experience in creating and -- most important -- in organizing the management of programs has been accumulated by the L'vov obkom of the Ukrainian Communist Party and by the Western Scientific Center of the UkSSR Academy of Sciences, the Dnepropetrovsk obkom and the Dnepr Scientific Center, and the Kiev gorkom of the party.

How, then, should the implementation of programs be organized?

The UkSSR Gosplan has been assigned the task of examining, during the first half of the current year, the composition of regional programs and of adopting measures for the improvement of mutual relationships with programs for economic sectors and for the republic. The commission of the presidium of the UkSSR Council of Ministers for questions of scientific-technical progress is called upon to have a more active role. It is incumbent upon party committees, their departments, and especially upon the party obkom departments for science and educational institutions, to show great concern. An important role belongs to the scientific centers of the UkSSR Academy of Sciences.

In the recently adopted decree of the Ukrainian Communist Party Central Committee and the UkSSR Council of Ministers, "On Certain Measures for Increasing the Effectiveness of the Activities of the Scientific Centers of the UkSSR Academy of Sciences in the Management System for Scientific-Technical Progress," new tasks were placed before the regional scientific centers, and the practice of concluding agreements for scientific-technical cooperation between the UkSSR Academy of Sciences and local enterprises and organizations was particularly approved. Everything that has been done within the framework of these agreements becomes a good basis for formulating regional programs, especially in oblasts where indigenous scientific potential is not very great. Control over fulfillment of agreements is assigned to obkoms and to the Kiev gorkom.

The scientific centers are increasingly becoming not only representatives of the republic academy of sciences but also interagency scientific-coordination bodies. They successfully supplement the existing system of management of economic sectors by strengthening relationships between sectors within regions. For the development of research on controlling scientific-technical progress, a special laboratory is being created in each scientific center. Of course, these laboratories, besides doing clearly research tasks, must also take on certain science-organization functions. It is very important to provide thoughtful and effective solutions to problems of selecting for them highly qualified people with initiative and to allot necessary working space. In oblasts where there are no scientific centers, scientific coordination councils are being created. Increase in effectiveness of scienti-

fic centers makes no sense without active participation by higher educational institutions and ministerial scientific-research institutes.

Formal postgraduate training requires serious improvement. Here, it is important not only to increase the significance of dissertation projects, but also to inculcate in the young scientist, the skills and habits of doing research at an up-to-date level and with the latest equipment and with the skill to introduce the best findings of creative research into production, persistently and purposefully. An extremely important problem is the training of specialists of the very highest qualifications -- doctors of sciences.

The world outlook of scientists, engineers, and specialists of various branches of knowledge has an especially important significance for the development of science and technology. This is caused by the necessity for the continuous development of methodological questions of science and for the creation of an effective system for mastering Marxist-Leninist methodology by all who conduct scientific research and, in the final analysis, who distinctly show that what is important in managing science and technology is the leadership of people working in this sphere.

On the threshold of the 26th CPSU Congress, the party organizations of scientific institutions of the republic are also concentrating their efforts on the solution of these problems.

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KIEV GORKOM SECRETARY EXPLAINS PARTY-ACADEMY COOPERATION IN PLANNING R&D

Kiev PRAVDA UKRAINY in Russian 20 Feb 81 p 2

[Article by D. Golovko, secretary of the Kiev city committee of the Ukrainian Communist Party: "Readiness for Action"]

[Text] In accelerating the introduction of scientific achievements into practice, the 10th Five-Year Plan taught us to find and utilize effective forms for strengthening ties between science and production. Kiev has accumulated definite experience in developing and implementing programs along various technological lines of development: "Casting," "Stamping," and "Tools." The purpose has been formulated clearly: to create model units for base enterprises through widespread introduction of progressive technology and by raising the technical level of production. Much useful has been done. There also have been bottlenecks and shortcomings. We formulated these programs in the middle of the plan period for the 10th Five-Year Plan. We were therefore not successful fully in supporting them with a strong resource base.

The republic's currently expanding work for improving control over scientific-technical progress, for formulating and developing scientific centers, and for creating republic and regional scientific programs -- is an example of a creative approach to the solution of the most important economic problems of the new Five-Year Plan. The work of party, Soviet, and planning bodies, enterprises, and organizations is all coming together into a single channel, and the single-purposed efforts of the scientific-technical community are being stimulated.

In the capital of the republic, six single-purpose complex scientific-technical programs have been formulated. Many types of factors pertaining to the development of various sectors of the city's economy have been taken into consideration; technical and economic substantiation of the programs has been conducted; and concrete aid has been given to enterprises in putting together plans for new technology. The experience of the UkSSR Academy of Sciences, approved by the CPSU Central Committee, has been widely utilized in the creation and introduction of the latest technology.

During the years of the five-year plan, over 250 new developments by the scientists of our academy will be introduced at enterprises in the city. An original "catalog directory" has been prepared of necessary developments, oriented toward inquiries from enterprises. An agreement has been concluded by the party gorkom and the UkSSR Academy of Sciences for scientific [illegible]cal cooperation for the five-year plan.

Our programs comprise a whole complex of problems for the improvement of life in a large city: improvement in working conditions, more economy in the use of energy and materials, an increase in comfort from the automatic control of city services, preservation of the environment and, finally, the provision of food products through the full utilization of agricultural raw materials and the improvement of means for preserving products.

In each of the programs, the end purposes have been determined and they all fully correspond to the requirements of the Basic Directions for the Economic and Social Development of the Country.

How are the programs formulated? A large circle of enterprises and scientific-research institutions, as well as administration and services, have been drawn into this. More than 300 organizations of 56 ministries and agencies of the country and of the republic are participating in the implementation of regional programs. Now, by a decision of the party gorkom bureau and the executive committee of the Council of People's Deputies, program councils have been created. They are to organize program fulfillment.

We clearly understand that in the successful implementation of the programs, the main things are organizational efficiency, control, and effective management. Here, there are many unsolved problems. Feedback from regional programs to republic programs has still not been developed, and there is no mechanism for coordination with planning bodies, at either local or republic levels.

In program development, we went from the ground up, having integrated certain enterprises and scientific collectives. Now we must go down the programs from the top down so that their positions become a part of local state plans and a vital matter for each collective.

The role of raykoms and primary party organizations must be more clearly defined in this work so that sections of city programs are continuously under their purview.

The creation of regional scientific laboratories of the UkSSR Academy of Sciences is contemplated by the decree of the Ukrainian Communist Party Central Committee and the UkSSR Council of Ministers on measures for increasing the effectiveness of the activities of the scientific centers of the UkSSR Academy of Sciences in the system for controlling scientific-technical progress. In this plan it is proposed that organizational solutions be adopted, that policy on these scientific laboratories be developed, after their status and real possibilities have been defined, and that ways be outlined for joint action between scientific units and regional planning bodies.

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ROLE OF SCIENTIFIC CENTER IN DONETSK IN REGIONAL ADMINISTRATION OF R&D DESCRIBED

Kiev PRAVDA UKRAINY in Russian 20 Feb 81 p 2

[Article by V. Bar'yakhtar, academician of the UkSSR Academy of Sciences (Donetsk): "Meeting the Requirements of Production"]

[Text] The Ukrainian Communist Party Central Committee regards highly the work of the Donetsk party obkom and the UkSSR Academy of Sciences in formulating regional programs directed toward the solution of the urgent problems of the economy of the oblast during the 11th Five-Year Plan.

Four programs have been put together. From the large number of problems that are urgent for the oblast, it was necessary to select the most substantial and to take accurate account of our possibilities. Finally, it was necessary to involve all of the scientific efforts of the Donbass and the republic Academy of Sciences in the solution of these problems.

We found that some institutes did not have the resources to engage in regional problems and that others had no desire to take on an additional burden.

The managers of some industrial enterprises did not see any obvious use in what is new. It was necessary to apply methods of explaining, convincing and, of course, using party influence. I recall a meeting of leaders from science, production, and party organizations from Donetskaya and Voroshilovgradskaya Oblasts. An agreement was signed between the UkSSR Academy of Sciences and enterprises and organizations of the Donbass. In it were reflected serious problems of the coal industry, ferrous metallurgy, and environmental protection. Therefore, these are problems at which the efforts of scientists and production specialists are aimed within the framework of corresponding programs.

The task was established for maximum utilization of the available scientific efforts in the region and also for broad involvement of other participants. Among the participants were over 350 enterprises and associations subordinate to 48 ministries and agencies.

Of course, the development of the programs is a responsible stage. However, an even more important and complicated stage is their implementation. As recommended by the Ukrainian Communist Party Central Committee, we created coordination councils for managing the implementation of the programs. The composition of a council, which

is chaired by an obkom secretary or by a deputy chairman of an oblispolkom, was approved by a party obkom bureau. For example, the coal program is managed by the secretary of the party obkom, N. G. Koval', and the metallurgy program, by obkom secretary V. G. Kucherenko. A system of control is now being created. The coordination councils and the bureau and council of the scientific center periodically will examine the progress of program fulfillment with participation by all those who are carrying out the programs. At least twice a year, these problems are put on the agenda of the party obkom's council for aiding the increase of effectiveness in production.

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ROLE OF SCIENTIFIC CENTER IN L'VOV IN REGIONAL ADMINISTRATION OF R&D DESCRIBED

Kiev PRAVDA UKRAINY in Russian 20 Feb 81 p 2

[Article by Ya. Podstrigach, academician of the UkSSR Academy of Sciences (L'vov): "In an Atmosphere of Cooperation"]

[Text] In the 10th Five-Year Plan, our center, in addition to coordinating fundamental research in academy and ministerial scientific-research institutions and higher educational institutions, concentrated its attentions on solving important scientific-technical problems related to increasing the effectiveness of production and quality of work in the leading economic sectors of the region.

A regional system for controlling scientific-technical progress was created. The coordination of fundamental research is accomplished by eleven scientific sections of the center; scientific-technical programs are developed within the framework of interagency special-purpose scientific-production associations, which enter into complexes, and also by a number of educational-scientific-production associations. The new organizational forms have allowed the strengthening of the subject matter of research, the concentration of scientific resources on the main trends, the significant reduction of the time cycle from a scientific-technical idea to its introduction, and the achievement of greater stability in relations between science and production.

During the years of the 10th Five-Year Plan in the western oblasts of the UkSSR, more than two thousand developments have been introduced into production, with significant economic effect. Among these, there were 190 developments on the part of our interagency scientific-production associations and four complexes.

In addition, 28 interagency educational-scientific-production associations are functioning in the region. Towards the end of the last five-year plan, a chemical technology complex and a social-economic complex were formed, and the formation of the interagency scientific-practical complex "Zdorov'ye" [Health] is being completed.

But the most important thing that should be emphasized is that, as a result of a large amount of work by party committees in the region, an atmosphere of cooperation has been created among the various agencies.

Significant work has been conducted for the further scientific needs of the basic branches of the region's economy, an agreement has been signed, and a complex plan

for the cooperation of science and production has been developed. Now, the tasks are being refined in the light of the decisions of the 26th Ukrainian Communist Party Congress. Scientists of the region, together with production specialists, will devote themselves to the most important scientific-technical problems. They have assumed their positions, speaking figuratively, on the main thrust of the offensive.

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ROLE OF SCIENTIFIC CENTER IN ODESSA IN REGIONAL ADMINISTRATION OF R&D DESCRIBED

Kiev PRAVDA UKRAINY in Russian 20 Feb 81 p 2

[Article by A. Bogatskiy, academician of the UkSSR Academy of Sciences (Odessa): "Taking Local Peculiarities into Account"]

[Text] In the CPSU Central Committee draft for the 26th CPSU Congress, it is stated that, in the 11th Five-Year Plan, the development of science and technology must be in still greater measure subordinated to the solution of the most important problems in the further progress of Soviet society and to the acceleration of the transition by the economy to the course of intensive development.

The scientific centers of the UkSSR Academy of Sciences, which are an integral link in the mechanism for controlling scientific-technical progress in our republic, have also been called upon to make their own contribution in accomplishing the tasks laid down by the party. A key factor is the selection of forms and methods for timely and highly effective solution of large-scale problems.

The Southern Scientific Center, in the years of the 10th Five-Year Plan, accumulated valuable experience in solving complex regional problems. We consider the forms of cooperation that were established between science and production to be very forward-looking and very promising.

Last year, a complex plan was completed for increasing the effectiveness of work in shipping. Thirty-two tasks were fulfilled that were directed toward improving the production activities of the shipping fleet, of ports, and of repair facilities. These tasks involved 11 academy institutions of the republic, 4 higher educational institutions, and 4 ministerial scientific-research institutes. A rather good economic effect was achieved. Innovations by cyberneticists saved many resources. A number of polymer materials were introduced into ship-repair practice, particularly special glues and methods for improving the processing and sea transport of cargo. Plans for the new five-year plan envision the fulfillment of 61 tasks for Black Sea shipping and 35 tasks for Soviet Danube shipping.

It is known that, in the scientific potential of the Southern Region, the distribution of institutions of the UkSSR Academy of Sciences, higher educational institutions, and ministerial elements is extremely disproportionate. Even more disproportionate is noticeable in individual oblasts of the region. This dictates the

necessity of searching for those forms of coordination that would involve the scientific efforts of other regions of the republic and of the whole country in our problems.

Seven complex regional special-purpose scientific-technical programs have been called forth to serve the aims of accelerating scientific-technical progress.

In the fulfillment of these programs, there is participation by over 100 industrial associations and enterprises, scientific-research, planning, design, and technological organizations, and higher educational institutions.

Now, since the republic party forum, we are thinking about how to raise the level of program management and about how more effectively to distribute responsibility for program implementation.

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the experience accumulated at the UkSSR Academy of Sciences and at the Siberian Department of the USSR Academy of Sciences, the presidium of the UkSSR Academy of Sciences has developed a /proposal for the organizational formation of academy scientific-technical complexes. Such complexes, each headed by an institute, should shorten the way from "research to production" by introducing the continuous planning of scientific-research and experimental-design projects and by improving the economic activities of the collectives that make up the complex and by centralizing their management./

In this connection, we propose that changes and amendments be introduced into the draft Basic Directions and that this portion of Section XII be formulated as follows:

> /"To continue to develop the network of scientific-production associations as an effective means for strengthening relations between ministerial science and the corresponding industrial enterprises. To create at leading academy institutes (where there is a need and where the necessary conditions exist) academy scientific-technical complexes (ANTK) and other progressive organizational forms that help raise the level of completion of scientific-research and experimental-design projects and the rapid introduction of their results into practice."/

The contribution of the experimental-production base to the development of scientific-instrument making must be increased. Here, as a rule, we cannot put our hopes on the instrument-making industry, since industrial enterprises are not enthusiastic about producing scientific apparatuses because they are produced in small series and have specific peculiarities -- give them large-series production.

Now, about 3 million rubles' worth of instruments are made each year by the UkSSR Academy of Sciences, but only about a third of this amount represents the cost of instruments made for the needs of the academy; the rest are for external use. This cannot be considered normal, as the requirements of academy institutes are still far from being satisfied.

No less complicated is the situation with the fairly large machine tool resources of our institutes' units that operate under cost accounting. Part of them are obsolescent; however, the necessity of replacing them frequently violates standards for length of service. /You see, in an academy experimental-production base, where new products are constantly being assimilated and new technology is being introduced, the machine-tool resources, of course, must be replenished more often than is customary in usual industrial enterprises, and this means that the standard lengths of service for machine tools and other equipment in this case must be different./

Analogous problems arise in connection with standards for labor productivity. It is not difficult to understand that /the standards that operate at the corresponding industrial enterprises cannot be transferred mechanically to an academy experimental-production base: industrial enterprises have mass-series, debugged production lines, whereas we have small series or unique items./

It is very important to change radically the way that republic academies of sciences are provided with supplies and equipment which, meanwhile, are inadequate. Every-

one recognizes that science is one of the productive forces of our society. Why, then, do clearly outdated instructions continue to operate in supply organizations that regard academy institutions as unproductive branches of the economy? The provision of supplies and equipment to academy science is far worse than to the specialized institutes of industrial ministries, especially when it comes to scarce, very up-to-date items, including unique research equipment, instruments, and reagents.

The whole complex of problems must certainly be reflected in Section III of the draft Basic Directions. We propose to introduce a number of changes and amendments into the paragraph of the text that is devoted to strengthening the experimental-production base of scientific-research and experimental-design organizations, and we have formulated the following wording:

> /". . . to strengthen the experimental-production base of academy and ministerial scientific-research and planning-design organizations. To increase significantly the production of instruments, equipment, automation means, reagents, and preparations for conducting scientific research, and also of spare parts for scientific apparatus and equipment. To establish centralized procurement of supplies and equipment for academy institutes and their experimental-production bases on the same basis as the procurement for scientific-research institutes of industrial ministries and industrial enterprises, in connection with which, outdated instructions are to be examined. To introduce necessary corrections to standards for the lengths of service for machine tools and equipment and also to standards for labor productivity, taking into consideration the specific character of academy experimental-production bases, and to utilize more fully the possibilities for support in supplies, equipment, and funding by those ministries and agencies that are interested in scientific-technical, technological, and other developments by academy institutes. To develop all possible cooperation between various units of the experimental-production base in the utilization of instruments, facilities, and other equipment and in accomplishing a series of model projects and also to organize centers for renting or exchanging scientific apparatus. "/

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INTER-VUZ CENTER CREATED TO SHARE EXPENSIVE SCIENTIFIC EQUIPMENT

Moscow IZVESTIYA in Russian 18 Feb 81 p 2

[Article by V. Mossakovskiy, rector of Dnepropetrovsk University and academician of the UkSSR Academy of Sciences, and L. Andreyev, professor: "The Road to Scientific Cooperation; Higher Schools"]

The first Inter-VUZ Center for Service to Scientific Research, created at Dnepropetrovsk University, has operated now about two years. Recently, it was transferred to cost accounting. Already the experience accumulated during this short time has shown that the need for cooperation among VUZ's is extremely great. The uniqueness and high cost of scientific equipment have become an appreciable obstacle to the development of science at higher schools. But for the completion of research with the manufacture of commercial models or the creation of technological processes, if this is a subject of development, it is necessary to have an experimental production base, and the closer it is to scientific laboratories, the more that completed developments will be embodied in concrete material things of value.

Before a special building is constructed for the Inter-VUZ Center, the Center is being housed in university buildings and operates on the basis of existing laboratory equipment. But under these conditions, a significant volume of research and analysis has been fulfilled on orders from all of the city VUZ's and from a number of scientific-research institutes.

At the present time, the Inter-VUZ Center does various types of services. The Computer Center grants machine time, carries on training in programming, develops handbooks for mathematical support, and provides for the collection and storage of algorithms and programs. Various complicated analyses can be done on up-to-date equipment.

There is no doubt that the quantity of services will increase in the future.

We consider that in the Basic Directions, in the section devoted to science and the acceleration of scientific-technical progress, to the words "to increase effectiveness in the utilization of the scientific potential of higher educational institutions to accomplish economic tasks" should be added the words /"developing inter-VUZ cooperation in every way possible and hastening the construction of inter-VUZ centers for cooperation."/[in boldface and underscored]

In a new operation, inevitably, difficulties arise. And it is very important to find timely ways to eliminate them. When creating inter-VUZ centers, it is necessary immediately to determine ways for the planned supply of materials to them. Scientific supervision over work fulfillment is also a complicated problem. Various types of analysis should be conducted under observation by scientists. Now, control over the course of analysis is a kind of social burden borne by the department and laboratory scientists in whose domain the equipment is located. But this cannot remain a permanent system. It is necessary to find forms of incentives for VUZ scientists in this work.

Recently, the attractive idea arose of creating independent research units at the Inter-VUZ Center. Such units could fulfill orders for certain types of scientific research, including research for industrial enterprises.

It is important, in a word, to give wide scope to inter-VUZ cooperation.

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INCREASED PERSONNEL COOPERATION URGED FOR ACADEMY OF SCIENCES AND REPUBLIC VUZ'S

Baku BAKINSKIY RABOCHIY in Russian 12 Mar 81 p 2

["Azerinform" article: "To Improve the Training of Scientific Personnel"]

[Text] In the Basic Directions for the Economic and Social Development of the USSR, scientists are given responsible tasks in the further development of scientific research, the acceleration of scientific-technical progress, and in the training of scientific personnel. Ways to attract young specialists to scientific research more effectively and problems in the improvement of training scientists through graduate study were discussed at a republic scientific conference that opened 11 March in Baku. Participating in the conference were graduate students from scientific institutions of the Azerbaijan Academy of Sciences and of higher educational institutions of the republic, and leading scientists.

Opening remarks were presented by G. B. Abullayev, president of the AzSSR Academy of Sciences and a corresponding-member of the USSR Academy of Sciences. Addresses and reports were heard on various trends in science.

It was noted at the conference that, in recent years, relations have been expanded and strengthened between the republic Academy of Sciences and the republic Ministry of Higher and Secondary Specialized Education, mainly in accomplishing the training of scientific personnel. VUZ's participate in joint research with academy scientific institutions according to coordinated plans in the natural and social sciences, fulfill projects on the basis of scientific cooperation agreements, and jointly issue scientific works. Scientists from higher schools are involved in putting together important economic programs and associates from academy institutes provide scientific-methodological aid to VUZ's.

At the same time, it was stressed at the conference that this cooperation had not been systematic. VUZ department and laboratory workers do not participate sufficiently in the fulfillment of scientific research according to coordinated plans of the Academy of Sciences, and few high-priority projects are being fulfilled that have fundamental or applied significance. VUZ graduate students should be more widely involved in research at the Academy of Sciences, which has a significantly better technical base for carrying on effective developments.

Conference participants noted that, even though the training of scientific personnel had improved, still a fairly large portion of graduate students -- over 25 percent

of those completing study -- failed to complete their candidate dissertations. It is necessary to conduct a more careful search for talented young specialists who have been successful in production and who have aptitude for scientific work. The quality of prepared dissertations is going down and some of their authors do not even know Russian very well.

At section meetings, graduate students reported on the results of their research.

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INFORMATION CENTERS NEEDED TO COORDINATE OBLAST-LEVEL RESEARCH ORGANIZATIONS

Minsk SOVETSKAYA BELORUSSIYA in Russian 20 Feb 81 p 2

[Article by L. Olizarovich, deputy director of the Grodno center for scientific-technical information of the Belorussian Scientific-Research Institute for Scientific-Technical Information of BSSR Gosplan: "When There Is No Coordination"]

[Text] For the successful accomplishment of the tasks set for the 11th Five-Year Plan, there is no small importance in bringing out the advanced experience of the best enterprises, analyzing it, and disseminating it. Active participation in this work should be taken by planning bodies, scientific-research and experimental-design organizations, industrial enterprises, information organizations, scientific-technical societies, the All-Union Society of Inventors and Rationalizers, and "Znaniye" [knowledge] societies.

All of these organizations are present in the capitals of union republics and in almost all oblast centers. It would seem that the large circle of people, specialists in their own affairs, would strive toward one goal. But the needed effect is not being achieved at the present time. And the reason is that they do not have a clear idea of one another's work toward this goal.

Oblast centers of scientific-technical information, scientific-technical societies, and the All-Union Society of Inventors and Rationalizers coordinate their actions only in carrying out large measures, and not always then. Coordination takes place with assistance from the party obkom and the oblispolkom of the Council of People's Deputies. These are such measures as conferences, seminars, exhibits of inventions and rationalizers' proposals. As for other examples of efficient cooperation, there are none.

There is no cooperation within the territory of one oblast or within such an important sphere of activity as scientific developments, their publicity through information media, or control over introduction in production.

At present, no one in an oblast has summary information on what topics, needed for oblast branches of industry, are being developed at scientific-research institutes and design bureaus, what has already been developed, what kind of information has been published about them, where they are headed, which enterprises of the oblast have needs for such developments, and which enterprises can introduce these developments into production. Nowhere are these data collected and analyzed.

Without such data, local management and planning bodies cannot effectively exert influence on the status of this work or control its development in the needed directions.

In the 11th Five-Year Plan, it is important to direct chief attention not on individual measures for the information center, scientific-technical societies, and the All-Union Society of Inventors and Rationalizers, but to examine them in the context of the general complex plan for the oblast. The activities of these organizations cannot be separated from the concrete needs of the oblasts they serve. They must be coordinated with the work of planning bodies and scientific-research and planning-design organizations.

These questions can be decided through the creation of a coordinating body, whose plans and instructions would be binding. It is important that, in its activities, such a body would not duplicate any of the named organizations. By coordinating the plans of oblast organizations, it could exclude duplication and measures that have little effectiveness.

At the present time, of five oblast centers for scientific-technical information that have been created in Belorussia during the 10th Five-Year Plan, only one has more or less adequate facilities for work; others do not have necessary equipment. In Grodno, an oblast information body has existed for over 20 years. At first it was an oblast information department, and then it was an information center. And during all these years, workers of this organization have never been allotted quarters. There is a similar situation in other oblast information centers.

To solve these problems, I propose that the following provision be introduced into the draft Basic Directions: /"To create, under ispolkoms of oblast councils of people's deputies, sections for information and science-production relations. Through these sections, to bring about oblast coordination of activities of planning bodies, scientific institutions, industrial enterprises, scientific-technical information organizations, and councils of scientific-technical societies and the All-Union Society of Inventors and Rationalizers, for forecasting, development, information, and the introduction of scientific-technical achievements, at the same time helping to improve relations between science and production."/[in boldface]

After this work has been improved in each oblast, the problem can be solved in the whole republic.

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GLEBOV DESCRIBES LENINGRAD'S INTERDEPARTMENTAL COORDINATING COUNCIL

Moscow IZVESTIYA in Russian 1 Jan 81 p 2

[Article by Academician I. Glebov, authorized representative of the presidium of the USSR Academy of Sciences and chairman of the interagency coordinating council of the USSR Academy of Sciences, Leningrad: "Energy for the Search"]

[Text] One can say that each year has its own face, its own distinctive marks, and its own tasks. These individual features are not peculiar to time itself; they are provided by people.

The year 1981 is illuminated by the light of the forthcoming 26th CPSU Congress. It is portentious for the country not only because its first days mark the take-off of the 11th Five-Year Plan. This year is distinguished from others even more because it opens up before our people distinct prospects for all of ten years ahead. Prospects so visibly charted in the CPSU Central Committee draft for the 26th CPSU Congress.

New tasks and new great undertakings await Soviet scientists in the 11th Five-Year Plan. Very likely, never has science been challenged by such a role as it is called upon to play today.

Continuous growth in the role of science in today's society is accompanied by rapid rates for realizing the results of scientific research. But this only takes place when scientists, enterprise managers, and specialists in all phases of new technology creation operationally select the necessary direction of work and coordinate their activities for the effective use of all resources.

The draft CPSU Central Committee draft for the 26th CPSU Congress, "Basic Directions for the Economic and Social Development of the USSR for 1981 to 1985 and for the Period to 1990," provides for the following: "To increase the effectiveness of scientific research and to reduce significantly the time it takes to introduce the achievements of science and technology into production. To improve the coordination of activity among scientific institutions, to extend the ties of fundamental and applied research with production . . . " and, further, "To provide for the development and implementation of single-purpose complex programs for the solution of the most important scientific and technical problems."

In recent years in various regions of our country, new forms have been proposed for the coordination of scientific work and for the improvement of relations between

scientific institutions and production collectives in order to help accelerate scientific progress. For over a year and a half, an interagency coordination council under the USSR Academy of Sciences has operated in Leningrad. It has as its aim the development of research along the leading lines of natural, engineering, and social sciences in which the USSR Academy of Sciences institutions are engaged in Leningrad and Leningrad Oblast, in Arkhangelskaya, Murmanskaya, and Pskovskaya Oblasts, and in the Karelskaya ASSR. The council also conducts science organizational work directed toward the fulfillment of research plans by academy institutes and the rapid introduction of its results into practice.

The interagency coordination council has in its composition 14 specialized councils relating to various branches of science and important complex scientific problems. The activities of these councils cut across the lines of economic sectors. Their aim is the development of fundamental and applied research that aids the fulfillment of national tasks and the solution of the problems of the Northwest Economic Region.

Recently, the interagency coordination council of the USSR Academy of Sciences concluded an agreement with the RSFSR Ministry of Higher and Secondary Specialized Education for joint research and for training personnel. We think that such cooperation will permit the increase of effectiveness in research.

In a relatively short time, notable results have already been achieved. One can be convinced of this by the example of the council's work on problems in electrical and power machine building and in power. On the initiative and under the management of the Leningrad Oblast committee of the CPSU, it developed, jointly with ministerial scientific-research and design institutes and industrial enterprises, a complex program for Leningrad organizations for the solution of the problem, "Increasing the Effectiveness of the Fuel and Energy Complex of the Country." It provided for the creation of a large number of pieces of new power and power-using equipment and the assimilation of series production of already developed equipment, with indicators corresponding to the best world models.

The complex program, the implementation of which involves 165 organizations, was broken up into particular programs tied to the solution of the most important scientific-technical problems in the development of the fuel and energy complex of the country for 1980 to 1990 along 16 lines of development. Among them are atomic power, hydropower, atomic energy machine building and thermal power, the transmission of electric power, the rational utilization of fuel and energy resources and improvement of energy-using technological processes, new means for obtaining energy, creation of generators, turbines, and reactors, and others.

All of the work will be coordinated by the oblast staff under the CPSU Leningrad Oblast Committee council for economic and social development and by the interagency council of the USSR Academy of Sciences . It is assumed that the council will coordinate scientific-technical tasks, while the oblast staff will coordinate organizational and production aspects.

In the composition of the staff, there are operating 16 specialized sections corresponding to problem trends in the fuel and energy complex of the country. The sections have been formed from leading specialists of academy institutions, minis-

terial scientific-research institutes, higher educational institutions, and production enterprises. They are based at the head organizations that are responsible for the corresponding tasks in the development of the fuel and energy complex.

I should point out that the development of the complex program and structure of the oblast staff drew upon and developed the experience of Leningrad party organizations and also that of the scientific, design, and production collectives of the city, who provided the high quality work and short construction time of the Sayano-Shushenskaya GES.

A high degree of economic effectiveness is characteristic of the projects provided for by the complex program. A large proportion of the equipment being developed on the basis of this program will reach series production largely in the 12th and 13th Five-Year Plans. Therefore, the basic economic effect for the country will be achieved after 1990. But already in the 11th and 12th Five-Year Plans, every ruble spent on the complex program will yield several rubles' profit.

Leningrad energy experts have carefully analyzed the tasks contained in the CPSU Central Committee draft in the area of raising the effectiveness of production, and they have decided to add a special program to the contemplated complex of measures, the accomplishment of which will allow an increase in the effectiveness of production at enterprises of the power-machine-building and electrical-equipment industry .

Among the especially ponderable measures, one can list those like creating production capacities for the yearly output of enough power equipment (reactors, turbines, and generators) to provide for atomic electric stations of 6 million kilowatts in volume, increase in the production of power equipment by 6.2 million kilowatts above that provided for in the draft plan for the 11th Five-Year Plan, and provision for a significant growth in volume of products at operating production facilities by means of labor-productivity growth. In the 11th Five-Year Plan the manufacture of power equipment for atomic electric stations will be doubled, and gas turbine assemblies and gas turbines for power will be increased by a factor of 1.5 over the production achieved under the 10th Five-Year Plan.

The results of implementing this program in the 11th Five-Year Plan will bring an economic effect of hundreds of millions of rubles.

By the date of the opening of the 26th CPSU Congress, the collectives of the Leningrad electrical-equipment and power-machine-building enterprises have committed themselves to finish ahead of time a reactor frame for the Kalininskaya AES, to provide a lead-in for the fourth power block of the Leningrad AES imeni V. I. Lenin, and to complete a technical design for a hydroturbine with a capacity of 330 thousand kilowatts for the Boguchanskaya GES.

Sixty years ago, the 8th All-Russian Soviet Congress approved the first State Plan for the Electrification of Russia, which has gone down in history as Lenin's GOELRO plan. This plan, adopted in a time of incredible difficulty for the young Soviet state, ended with words of optimism and unshakable faith in a bright future: "After us, there will be other people with a more perfect reserve of strength and resources."

They came. And they created giant power plants that are not equalled today in the world. The goals of the GOELRO plan were exceeded long ago and many times over. The total capacity of all electric power stations of the country are approaching 270 million kilowatts. The huge power program outlined by the party for the 11th Five-Year Plan will further allow the Soviet economy to hasten its movement forward. Scientists, specialists, workers, and service people of the City of Lenin are all working for the implementation of this program. Their many-faceted work will be a concrete response to the party's appeal: "To achieve an organic union between the achievements of the scientific-technical revolution and the advantages of the socialist system."

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SIBERIAN ACADEMIES INTEGRATE RESEARCH ACTIVITIES

Moscow SOVETSKAYA ROSSIYA in Russian 13 Feb 81 p 1

[Article by A. Usol'tsev, personal correspondent of SOVETSKAYA ROSSIYA for Novosibirskaya Oblast: "The Union of Three Academies; A Personal Correspondent's Point of View"]

[Text] Favorable prospects for all-out, complex development of the productive forces of Siberia -- this largest region of the country -- have been opened up by the creation in Novosibirsk of a powerful scientific nucleus consisting of three academies -- the USSR Academy of Sciences, the All-Union Academy of Agricultural Sciences imeni V. I. Lenin, and the Academy of Medical Sciences. Each of the academy subdivisions here is accomplishing important economic tasks and is helping to increase the effectiveness of civil production. But there are problems for which swift solution requires interacademy integration -- the bringing together of the scientists and specialists of various agencies offering different lines of research in fields of science. This kind of cooperation and coordination of the work of Siberian scientific institutions was the aim of the CPSU Central Committee decree, "On the Activity of the Siberian Department of the USSR Academy of Sciences in the Development of Fundamental and Applied Scientific Research, in Increasing Their Effectiveness, in Introducing Scientific Achievements into the Economy, and in the Training of Personnel" (January 1977). The role of coordinator was entrusted to the Siberian Department of the USSR Academy of Sciences.

Research experience in recent years has shown that very often the more worthwhile results are achieved by scientists at the "interstices" between such disciplines as physics and biology or mathematics and chemistry. But the effectiveness of work in the specialized academies is directly proportional to the attention that specialists devote to the fundamental sciences. Close cooperation between scientific efforts has become an obligatory condition for the accomplishment of the tasks posed by practice. Industry and agriculture justifiably expect scientists to provide carefully substantiated, profound, and thoroughly weighed recommendations.

Today, after four years, we are speaking of the further development of interacademy relations -- about increasing the contribution of science to production. On the basis of scientific integration in Siberia, important theoretical and applied results have already been achieved; part of them are being introduced into production and are yielding high return.

For the most urgent problems, it is necessary to undertake joint projects formulated by cooperation agreements. It is also necessary when there are already fundamental developments and an expected result can clearly be foreseen. An example of such a problem was introduced by A. G. Aganbegyan at a joint meeting in December of the presidiums of the three academies: one of the most important tasks facing the country in the 11th Five-Year Plan is the creation of an agricultural-industrial complex. In Siberia, still not enough has been done for the dependable provision of food supplies to the population. Therefore, the general task of the scientists of the region -- to develop a program for the "Agrarian Complex of Siberia" -- has state-wide significance.

It should provide for large-scale measures for chemicalization and land development; research should be done on the problem of changing parts of Siberian river channels in Kazakhstan and Central Asia; and an adjustment should be worked out among these regions of the so-called "green bridge" -- that is, the mutually advantageous exchange of fruits and vegetables.

For the accomplishment of tasks on such a large scale, the efforts of scientists of all agencies should also be united.

The experience of close cooperation among Siberian scientists reaffirms the advantages of the special-purpose-program approach to the accomplishment of vital economic tasks. However, at the same time, it also exposes some other no less vital problems. Joint projects are effective only when they are done on the basis of strictly agreed-upon methods and special-purpose financing, independent of the administrative subordination of the participating parties. In this connection, it is very important to constrain spheres of research so as to avoid duplication and parallelism. It is no secret that in interacademy relations, one still finds the approach, "it may not be good, but it's ours."

Take even the problem of utilizing automation equipment and methods of mathematical modeling in medical research. While it is being solved with difficulty, one often observes duplication, and these projects are costly. Here is just the kind of situation that requires coordination of effort by the three academies.

One cannot help also noting the fact that effectiveness in the use of costly, unique instruments, experimental facilities, and research proving grounds is still low. It is well known that a scientific instrument on the average is more costly by a factor of 10 than an instrument in industry. Therefore, scientists of the Siberian departments of the three academies are faced with the task of fully realizing the advantage given them by close geographical location. It is in Novosibirsk that it would be useful to create a "rental station" for costly instruments and equipment for scientists of various agencies. This is true especially as the Siberian Department of the USSR Academy of Sciences has already made a start at this: the section for metrology services has transferred to cost accounting part of the instruments and doubled their use in only a year. Is it not time to make cooperative use of equipment an obligatory condition for joint research?

And there are still more problems for Siberian scientists to solve if they are to strengthen interacademy relations. And the most basic is the problem of training specialists. Many scientists justifiably think that the number of probationers

from ministerial institutes to the "big" academy should be increased and that university graduates should be more actively sent to ministerial scientific units. In the training of researchers there should be this kind of exchange: it obviously enriches and broadens the outlook of the specialists themselves and it raises their work , and the level of the research institutions, to a new scientific stage of development.

At the December meeting of the presidium of the Siberian departments of the three academies, scientists outlined the basic directions for joint research under the 11th Five-Year Plan, proceeding from the tasks in the CPSU Central Committee draft for the 26th CPSU Congress. And although it is still far from smooth going on the "rocky road" of joint work, there is no doubt about the road selected: the union of the three academies is a hopeful foundation for hastening the development of the productive forces of the region.

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BETTER CONTROL NEEDED OVER CHOICE OF APPLIED-SCIENCE RESEARCH PROJECTS

Moscow PRAVDA in Russian 23 Jan 81 p 3

[Article by G. Pakhtin, doctor of economic sciences: "What is in the Portfolio of Subjects? -- The Effectiveness of Science"]

[Text] In the CPSU Central Committee draft for the 26th CPSU Congress, the acceleration of scientific-technical progress receives a large amount of attention, and the task consists of the wide utilization of potential for this. Much of this potential involves improving scientists' efficiency. But doesn't their success to a large degree depend on what they do?

Planning of research begins with the determination of the subject matter. The answer as to how to select it cannot be found in any agency's circulars. Format and time-frames are described in detail. The most important thing, however, is left out: by whom and by what criteria is the decision made to include a subject or leave it out?

How, then, are subject plans formulated? Ask the leaders among those who do the work whether they have made the decision on the selection of subjects. "No," they say, making a careful distinction, "we have only made proposals." To the same question, a scientist-secretary or institute director responds: "No, we compile a draft subject plan and send it to the ministry." But the ministry has nothing to select from except the very draft plan that has been submitted for approval.

One can put the question this way: are performers selected for the subjects or do the performers determine the subjects for themselves? Formally, a good half of the subjects "come down" to institutes by direction from above. But are such subjects really "by direction"? If these subjects confront the institute with new tasks, then they should cause a definite disruption in the established specialization of the unit and require personnel with different qualifications. However, observance of a wide variety of institutes does not reveal any divergence among "directed" subjects either in specialization or in the personnel of the units. The researchers continue to work in their usual rut and each part of the plan corresponds to a specific cubbyhole of the institute structure. Where does such sharpshooters' precision come from? The answer is simple: many subjects appear in the ministries' programs on the initiative of the institutes. Then, returning as tasks, they involve nothing unexpected.

Another portion of the subject matter of ministerial scientific-research institutes is fulfilled according to economic agreements with enterprises. Here, also, not much selection takes place: you have to accumulate orders to equal the sum established by the financial plan. This often causes the institute to agree to any proposal.

Of course, the plans contain some researchers' proposals with subject matter that reflects initiative. But the proportion of such subject matter is not large -- not more than 10 percent, by financial measurement, of the volume of work by an institute.

When they say that a fickle bride had a big choice, you can judge by the number of potential grooms that were rejected. But if you ask any research institute for a list of rejected subjects, it is doubtful that they could show you any, for often as not there are none. Consequently, it is more accurate to speak of how subjects evolve rather than to speak of how they are selected.

Why is it like this? Because the plan contents are primarily determined by the composition and specializations of the staff. Workers at an institute include in their subject portfolio what they consider acceptable to them.

The system that has evolved is a two-edged sword. On the one hand, it means the utilization of researchers' knowledge and experience and faith in their knowledge. On the other hand, it means inertia and the inclination to continue the same work year after year. In literature, the positive hero is the one who is fanatically devoted to one subject throughout his life and achieves triumph through obstacles. But scientific and technical concepts keep changing more and more rapidly and the advocates of a progressive technical idea can quickly become the defender of yesterday's technology.

Because of the absence of strict and objective selection, it sometimes appears possible for one to keep working on the same old pet project for many years in succession (the wording of the plan can be varied). Thus, in one research institute of a chemical nature, for many years a small laboratory studied and developed means for obtaining hydrogen peroxide. Meanwhile, more advanced methods already had been found and introduced long before. Then why did they keep working on the old one? Because there was a specialized staff that knew "its own" process thoroughly and wanted to work on it further.

Another manifestation of inertia is petty subject matter. This means not only the predominance of simple projects of small volume and cost, but also the orientation toward partial improvements of already assimilated technology in place of creating conceptually new technology. As a result, in many institutes less than half the subjects lead to the creation of really progressive items that excel the best domestic or foreign models.

Science is a revolutionizing force in civil production. But it has its own inertia. Consequently, science itself needs a force to overcome this inertia.

Such a force must be searched for in rational management. First of all, it is obvious that the planning of subject matter must be controlled. This does not mean

depriving researchers of the rights and opportunities to participate in its formulation; that would be very unreasonable. One must search for the possibility to preserve what is valuable in the accepted system and to eliminate its weak points; one must provide effective selection of timely subject matter. As early in the process as the formulation of the portfolio of proposals, as full an array as possible should be foreseen for research directions and variants, and a maximum range should be provided for selection. Proposals by subordinate units of research institutes in this case should not automatically become the basis for the subject plan, but should be compared with others as a contest among equals. This requires the introduction of a strict system of expertise and a concrete determination of the level for making decisions and taking responsibility for them.

Secondly, we must learn how to "suppress" ineffective subject matter. If, at times, it is difficult to substantiate and defend new lines of research, it will be much more difficult to dismiss subjects already being worked on, even if their hopelessness has become obvious. But the sifting out of such projects is necessary. In the mechanism of subject planning, it is useful to provide for regular recertification of on-going projects on the basis of expert evaluation of intermediate results.

Thirdly, we must learn how to get scientific workers to switch to the solution of new scientific-technical problems. The 3d section of the CPSU Central Committee draft quite correctly notes the necessity for timely changes in the direction of research and development and in the organizational structure of scientific institutions. Science is passing from extensive development to intensive development. The growth in useful results is more and more being achieved not by the expansion of staffs, but by effective use of existing ones. And if every scientist stubbornly clings to the subject that once fell to his lot, there will be no one to take on new tasks.

Under conditions when no growth in the number of personnel in the sphere of science is foreseen, the inflow of fresh forces are possible only on the basis of a sort of outflow. An urgent task is to organize the outflow of nonproductive manpower. Laws in force offer for this a system of certification and reselection of associates by competition, but in many institutes they have become a mere formality. We are not accustomed to using a contract system for hiring. A specialist comes to a permanent job in just as permanent an organization and he neither designs an actual machine nor conducts definite research, but his position of service depends little on the successes in these things. In my view, we must tie the evaluation of a worker's business-like qualities to an evaluation of his fulfillment of assigned subjects and reselect him through competition not for the next period of time but for the next subject.

A large effect can be expected from conducting competitive developments, when the solution of individual problems is assigned simultaneously to several institutes. If, through competition a better technical solution is found, the advantage may cover the additional expense of parallelism. It is important to determine accurately the kinds of tasks that deserve such duplication.

To improve the planning system, it is worth providing various types of competition. In some cases, let the competitors independently conduct preliminary studies of the

problem and then assign the task (and financing) to the one whose ideas promise the greatest effect. A competition of results is also possible when full-cycle development has been completed by participants.

All of the above has pertained to applied science and to ministerial scientific-research institutes and design bureaus. But in fundamental research, the system for planning subject matter is similar.

To improve the mechanism for managing science, it is necessary to differentiate. What is good for one field of science is bad for another. In fundamental science, the selection of subject matter must be left primarily to the scientists because no one knows better than they what next step is necessary. Here, excess control and principles of direction can contradict the logic of scientific investigation. Applied research and development are another matter. Here we must achieve a combination of the technical needs of society with scientific possibilities.

I believe that the tasks of further improving the management of research and of intensifying scientific investigation should be more fully reflected in the 2d section of the Basic Directions.

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SCIENTIFIC-TECHNICAL PROGRESS PLENUM TO BE HELD SOON

Tbilisi KOMUNISTI in Georgian 17 Feb 81 p 1

[Editorial: "The Perspective of Science"]

[Text] It can be said without exaggeration that some three weeks ago all Georgia was massed as a single, solid audience with its attention riveted to the 26th GCP Congress. This grand forum of communists laid down clear guidelines for the future, spelling out the specific tasks of the republic's economic progress.

The congress focused special attention on the development of science, on enhancing its effectiveness and accelerating the adoption of research results in production and practice. Concern for these matters is concern for the republic's future, concern for the republic's tomorrow.

The contribution made by Georgia's scientists in the past five-year plan was acknowledged with respect and gratitude, with genuine party solicitousness. Under the unprecedented development of the scientific-technical revolution, the times and the epoch have imposed upon them truly great responsibility, and they in turn are devoting all their knowledge and energy to honorably carry out their duty to the country and the people. Naturally, inestimable importance attaches to the party's everyday attention and supervision of science, in order to direct scientific research properly and see to it that scientific advances are introduced into practice in a timely manner. For the scientific cadres, this kind of concern has resulted in the successes which helped bring about further acceleration of scientific-technical and social-cultural progress in the 10th Five-Year Plan just past.

The 10th Five-Year Plan witnessed the successful continuation of fundamental research in mathematics, physics, chemistry, biology, psychology, philosophy, and other traditional as well as new disciplines. The adoption of the results of scientific research in the economy became increasingly effective.

The GSSR State Committee for Science and Technology and the Academy of Sciences, along with the higher schools and ministries, drew up 20 integrated scientific-technical programs covering more than 300 themes. The use of the program method of scientific research in the past five-year plan made it possible for scientific, project-planning, and design organizations as well as many industrial enterprises, regardless of their departmental affiliation, to join forces to resolve vital economic problems.

A good example of the successful ... of modern methods of control is the Rtveli ASU [Automatic Control System], which was set up in eight rayons of Kakheti and played a vital role in accelerating the harvesting and processing of the grape harvest. It helped to improve product quality and at the same time saved considerable resources and technical equipment.

Georgian scientists have actively collaborated with a number of large industrial centers not only in our republic but throughout the Soviet Union. Many of their works have been given awards and prizes. Consider, for example, the group of staff members of the chemistry institutes of the Georgian Academy of Sciences, the Madneuli Mining-Concentration Combine, and the Nonferrous Metallurgy Ministry's Leningrad Gipronikel Institute, who have done a great deal to work out an autoclave-hydrometallurgical technology to obtain highly-dispersed copper powder and active manganese dioxide. This work was awarded the Georgian SSR State Prize in 1980.

Electronics, radio equipment, and communications industry ministry facilities have successfully adopted a technique developed by the Chemical Metallurgy Center of the Metallurgy Institute of the Georgian SSR Academy of Sciences for metallizing various materials, which makes it possible to conserve precious metals, improve product quality, and boost labor productivity.

On the basis of research carried out by the Plant Biochemistry Institute, the republic's higher organs passed a decree concerning the use of enzyme compounds in the republic's food industry. A technology developed by the institute in collaboration with Gruziya-Chay Association to produce dry food concentrates is making it possible to utilize all tea industry wastes and low-grade leaf.

Many more examples of this kind could be listed. They testify to the tangible achievements of Georgian scientists. This is most clearly seen in the fact that the economic effect from adopting scientific and technical advances in the economy rose by 177 percent over the previous five-year plan. These are solid achievements, to be sure, but there are still far too many unutilized reserves and means; we must keep in mind that in almost all parameters of scientific-technical progress our republic lags behind union averages.

Accelerated scientific-technical progress must be the concern not only of scientific and economic but also party and soviet organizations.

Immediate attention must be focused on finding and adopting new organizational forms of work in order to enhance research effectiveness and strengthen the link between science and production.

The scientific-research institutes must strengthen the design-technology subunits. Large enterprises must pay particular attention to the creation of laboratories, experimental shops, and other research subsections functioning as the intermediate link between the scientific-research establishment and production.

In the CPSU CC's draft for the 26th Congress it is stated emphatically that the experimental-production base of the scientific-research and planning-design organizations must be strengthened. This will enable scientists and engineers to carry their works and research through to completion and turn them over to industry, thus accelerating scientific-technical progress. "Further intensive development of science,

of scientific-technical and social-economic progress, is the most vital task of Georgia's Communist Party in the 1980s," said Comrade E. Shevardnadze at the 26th GCP Congress.

As is well known, a GCP CC plenum will be held in the near future to discuss further strengthening of the party's supervision of science and scientific-technical progress. Deliberate, careful planning for this plenum, moreover, is the urgent business of all party organizations as well as scientific workers.

The congress mapped out specific paths of development. Taking them into account and following the directives will make it possible to mobilize the scientists to resolve vital problems and implement the results of their research as quickly and effectively as possible.

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